AUSI Iron Project, Infrastructure Requirements, Wickham, Western Australia

Australian United Steel Industry Pty Limited

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 814
May 1996

THE PURPOSE OF THIS REPORT
When proposals are referred to the Environmental Protection Authority under section 38 of the Environmental protection Act, section 44 of the Act requires the EPA to report to the minister on:

- the environmental factors relevant to the proposal; and
- the conditions and procedures to which the proposal should be subject if it proceeds.

This report contains the EPA's environmental assessment and recommendations to the Minister for the Environment.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding Environmental Conditions which might apply to any approval.

APPEALS
If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS
Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE
Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 22 May 1996.

Environmental Impact Assessment (EIA)
Process Timelines in weeks

Date	Timeline commences from receipt of full details of proposal by proponent	Time (weeks)
4/3/96	Proponent Document Released for Public Comment	4
1/4/96	Public Comment Period Closed	
5/4/96	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	0.571
10/4/96	Proponent response to the issues raised received	0.714
8/5/96	EPA reported to the Minister for the Environment	4

ISBN. 0 7309 5776 4
ISSN. 1030-0120
Assessment No. 999

Contents

Contents (cont)

Contents (cont)

Figures

Tables

Appendices

Summary and recommendations

The proponent, Australian United Steel Industry Pty Limited, proposes to construct and operate additional infrastructure to satisfy the requirements of the recently proposed AUSI Iron Project Direct Reduced Iron (DRI) plant near Wickham in the Pilbara region of Western Australia. The latter was assessed by the Environmental Protection Authority (EPA) at Consultative Environmental Review (CER) level. Reference should be made to EPA Bulletin 794 (December, 1995).

This new proposal has also been assessed by the EPA at the level of CER.

During the assessment the EPA sought public submissions and expert advice from the Department of Environmental Protection, the Department of Conservation and Land Management (CALM), the Fisheries Department of WA, the Department of Transport and the Department of Minerals and Energy (DOME), and has concluded that the main biophysical, pollution and social issues relating to the proposal are:

Biophysical

- marine and near shore impacts associated with the intake of ocean water for a reverse osmosis desalination plant and the discharge of this plant's flushing water back into the ocean. Also includes impacts from clearing, construction, dredging, filling, and operation of the ship loading facility, jetty, berths and other infrastructure, especially impacts on mangroves, corals, sea turtles, dugongs and other marine life; and
- protection of flora and fauna.

Pollution

- potential impacts on existing surface hydrology (such as stream location, flood plain alteration) due to the construction and operation of the additional infrastructure;
- dust and particulate emissions;
- liquid and solid waste disposal; and
- noise.

Social surroundings

- risks and hazards; and
- heritage areas.

The EPA during its assessment has utilised the information given in the CER and has taken into account the advice of the above expert agencies and additional information supplied by other government agencies, the public and the proponent.

The EPA has concluded that the proposal meets the EPA's environmental objectives subject to the proponent's commitments and the recommendations in this assessment report, and subject to the implementation of approved actions arising from the proponent's Environmental Management Programme (EMP).

Recommendation Number	Summary of recommendations
1	The proposal can be managed to meet the EPA's objectives subject to the recommendations in this report, the proponent's commitments, and the Authority's recommended environmental conditions.
2	The proponent should prepare a two stage EMP detailing the following to the requirements of the EPA, on advice from the DEP: Stage 1 - Before commissioning, the EMP shall address, but not be limited to the following: 1. Ocean cooling water intake and discharge of reverse osmosis desalination plant flushing water, and details of anti-fouling compounds • the nature and location of the intake, and discharge points on the ship loading jetty; • the sensitivity of the marine ecosystem to changes in temperature and the acceptability of a 1°C above ambient ocean water temperature discharge limit; • details of anti-fouling compounds that will be used to coat submerged structures; 2. Maintenance dredging requirements • maintenance dredging requirements for the shipping channel, including volume and frequency of dredging and methods of dredge spoil disposal; and 3. Dust and particulate emissions • a monitoring and audit programme for all dust and particulate emissions (including emissions from the ship loading facility, the entire length of conveyor and fugitive dust). Stage 2 - After commissioning, the EMP shall address, but is not limited to the following: 1. Ocean cooling water intake and discharge of reverse osmosis desalination plant flushing water • verification that mixing and the transport of the discharged reverse osmosis plant flushing water at the ocean outfall meets the agreed standard; • rectification measures in the event that monitoring indicates that water quality, mixing and transport of the discharged reverse osmosis plant flushing water at the ocean outfall are not to the agreed standard; 2. Mangroves details of any mangrove loss and measures to compensate for any loss during construction or operation of the additional marine based infrastructure as well as proposed rehabilitation or remediation programme; and 3. Meetings with relevant professional fishing representative group reports on the results of meetings with the relevant professional fishing representative group. Reports of the results of all monitoring programmes are to be submitted annually to the DEP for audit, and are to be made publicly available.

Recommendation Number	Summary of recommendations
3	Dredging should be undertaken in accordance with best industry practice in order to reduce impacts on the environment. Furthermore, all dredging should be undertaken during winter or otherwise to the satisfaction of the EPA on advice from CALM.
4	In consideration of the importance of mangal communities, the proponent should undertake whatever measures are necessary to ensure that there is no net loss of mangroves and that it maintains their function through: • least practicable direct disturbance; • maintenance of existing tidal patterns; • maintenance of existing ground water flows; • prevention of fresh water irrigation of mangroves through controlling drainage; • maintenance of sedimentation patterns; • maintenance of existing water quality; and • dust control.
5	Prior to construction, the proponent should undertake a fauna field survey of the areas that will be affected by the additional infrastructure, with the view of appropriate rehabilitation as required, in order to quantify the results of the desktop study provided in the CER.
6	If a decision is made that the proposal be implemented, the conditions set out in Section 6 of this assessment report should be applied.

1. Introduction and background

1.1 The purpose of this report

This report and recommendations provide the Environmental Protection Authority's formal advice to the Minister for the Environment on environmental factors relevant to the proposed development of additional infrastructure to support the recently proposed Australian United Steel Industry Pty Limited (AUSI) Direct Reduced Iron (DRI) plant near Wickham, Western Australia and the conditions and procedures to which the proposal should be subject if it proceeds.

1.2 Background

Since the commencement of the pre-feasibility studies for the original AUSI Iron Project, the proponent has stated its intention to share the Robe River Mining Company's (Robe) rail and port infrastructure. The location of the proposed DRI plant site was selected adjacent to Robe's Cape Lambert facilities for this reason. However, negotiations between the proponent and Robe failed in mid-December 1995. Therefore, it is necessary for the proponent to construct its own supporting infrastructure for the AUSI Iron Project.

1.3 The proposal

AUSI proposes to construct and operate a Direct Reduced Iron (DRI) plant near Wickham in the Pilbara region of Western Australia (Figure 1). This project was formally assessed by the EPA as a Consultative Environmental Review (CER) in accordance with the provisions of the Environmental Protection Act (1986). The findings of this assessment were presented in EPA Bulletin 794 (December, 1995).

That proposal envisaged the establishment of a Direct Reduction/Hot Briquetted Iron (DR/HBI) plant which used seawater for cooling. However, subsequent market research and further engineering design have resulted in the proponent making some changes to the original project, the most significant of which are:

- the production of DRI rather than HBI. Essentially, this change removes the requirement to briquette the DRI as it leaves the direct reduction shafts;
- the use of a desalination plant to supply all of the water requirements for the project. Fresh water obtained from the desalination plant will also be used for cooling purposes; and
- the need for the project to develop its own supporting infrastructure including a load-out facility, railway spur and gas pipeline.

The proponent indicated that the change to DRI from HBI is expected to reduce the emissions of hydrogen sulphide from the project as lump ore will no longer be used in the direct reduction shafts. The inclusion of a desalination plant will help preserve the valuable fresh water resource of the area. The proposed desalination plant flushing water discharge will have a lower salinity concentration (1.8 times seawater concentration compared to four times as originally specified), lower exit temperature (up to 1°C warmer than ambient compared with up to 4°C as originally specified) and lower heavy metal concentrations, than the previously proposed seawater cooling discharge. The proponent indicated that these proposed changes to the AUSI Iron Project are expected to reduce the overall environmental impacts of the project.

As negotiations between the proponent and Robe with respect to the proponent utilising Robe's existing infrastructure failed in mid-December 1995, the proponent will need to construct its own supporting infrastructure. The additional infrastructure will consist of:

- a railway spur line, from a point on Hamersley Iron Pty Limited's Dampier-Paraburdoo Railway approximately 2.5km south-east of Mount Prinsep to the DRI plant near Wickham;
- a gas pipeline, which will extend from Main Line Valve 7 (MLV 7) on the Dampier to Perth Gas Pipeline to the DRI plant site. The pipeline will be located adjacent to Robe River Mining Company's Karratha to Cape Lambert gas pipeline and/or Pilbara Energy Pty Limited's Dampier to Port Hedland gas pipeline. The proposed DRI plant will consume approximately 154,000Nm^3 of natural gas per hour; and
- a load-out facility, which will transfer DRI from the plant to ships for export. This facility would comprise:
  - a covered conveyor from the north-eastern side of the DRI plant to a berthing jetty;
  - a berthing jetty;
  - a shallow, partially dredged channel approximately 250m wide, 1.0km long and to a depth of 8m below AHD; and
  - the AUSI Iron Project's desalination plant water intake and flushing water discharge points.

Figure 2 illustrates the corridors within which the railway spur and gas pipeline will be located, and also shows the location of the DRI plant, tailings dam, overland conveyor and load-out facility. The railway corridor is approximately 1,000m wide while the gas pipeline corridor is 500m wide. These widths were selected by the proponent to allow flexibility in determining the most appropriate alignments according to environmental and engineering considerations during the project's detailed engineering stage. However, it is anticipated that the actual easements required for this infrastructure will be approximately 30m and 50-100m wide for the proposed gas pipeline and railway spur, respectively. The proposed location of the load-out facility and the area within which dredging is required is presented on Figure 3.

1.4 Assessment process history

A flow chart of the Environmental Impact Assessment process is shown in Appendix 1. The proponent referred the proposal to the EPA on 24 January 1996 for assessment. The EPA set the level of assessment at Consultative Environmental Review (CER). During the environmental assessment of this proposal the EPA utilised information supplied by other government agencies, the public and the proponent.

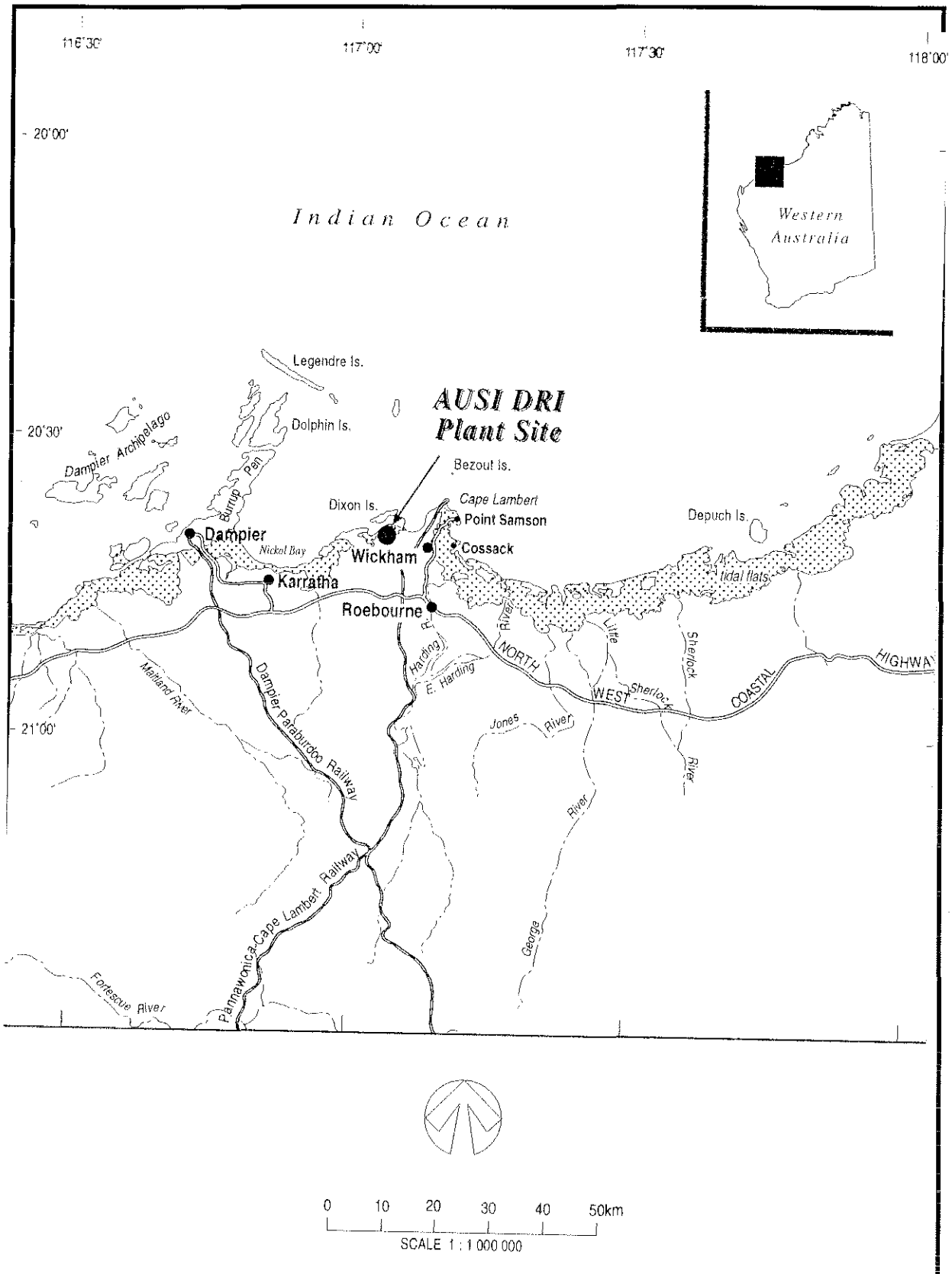
The CER was prepared in accordance with guidelines issued by the EPA. The CER document was released for public review for an 4 week period ending on 1 April 1996. A summary of issues raised in public submissions was prepared and forwarded to the proponent, and the proponent's responses were taken into account during this EPA assessment. Additionally, officers of the DEP discussed environmental issues with interested members of the local community and relevant government departments.

1.5 Structure of the report

This document has been divided into seven sections. Section 1 describes the historical background to the proposal and its assessment while Section 2 briefly describes the proposal (more detail is provided in the proponent's CER and in Appendix 4). Section 3 explains the method of assessment, the structure of this report and provides an analysis of public submissions.

Section 4 sets out the evaluation of the key environmental issues associated with the proposal. Each sub-section details the objective of the assessment, the likely effect of the proposal, the comments from submissions and the proponent's response to submissions. The adequacy of the response by the proponent is considered in terms of project modifications and environmental

management commitments in achieving an acceptable outcome. The Environmental Protection Authority analysis and recommendations with respect to the identified issues are contained in this section. Where inadequacies are identified, recommendations are made to achieve the environmental assessment objectives. Section 5 summarises the conclusions and recommendations. Section 6 outlines the recommended environmental conditions. References cited in this report are provided in Section 7.



AUSI Iron Project - Infrastructure Requirements

LOCATION MAP

Figure 1. Regional location map, proposed infrastructure. (Source: Figure 1.1 of the CER)

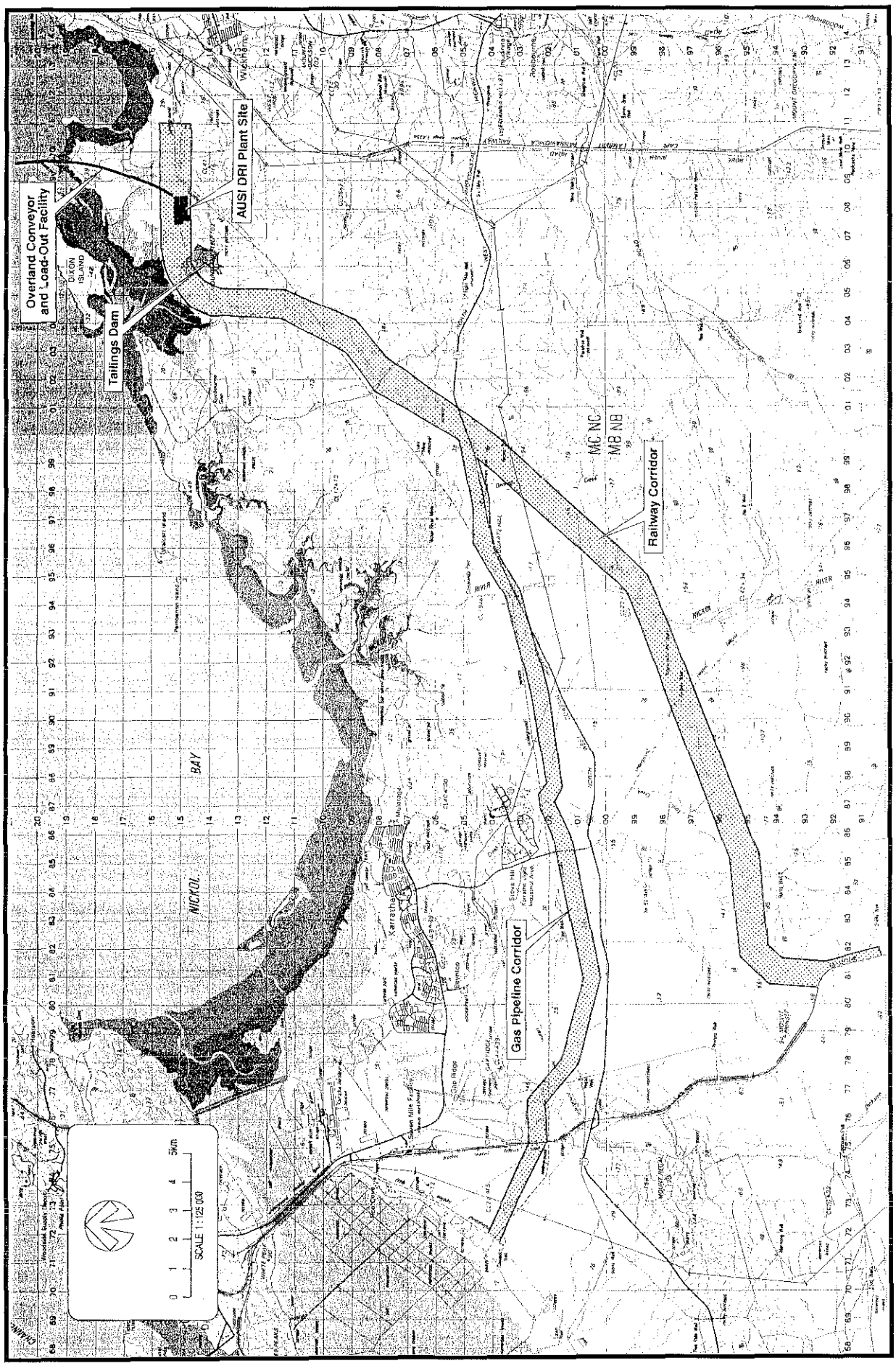


Figure 2. Location map, proposed infrastructure. Source Figure 1.2 of the CER)

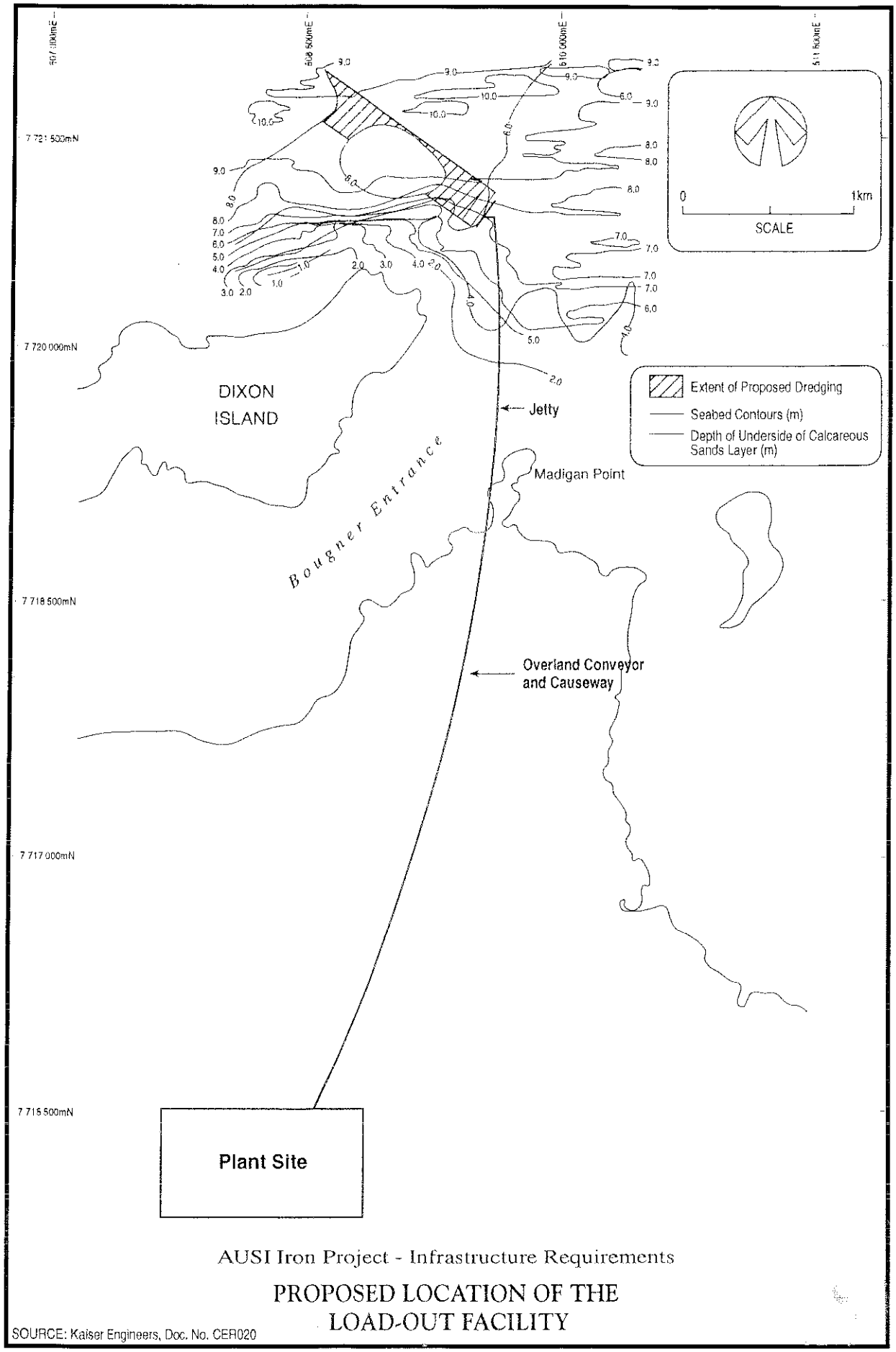


Figure 3. Location map, proposed load-out facility. (Source: Figure 1.3 of the CER)

2. Summary description of proposal

2.1 Need for the proposal

The CER indicated that the breakdown in commercial negotiations between the proponent and Robe in December 1995 has resulted in the need to construct additional infrastructure in order to allow the AUSI Iron Project to proceed.

The development of the AUSI Iron Project was proposed by the proponent in response to the growing world demand for DRI which is primarily used as feed stock for electric arc furnaces. The plant would add value to iron ore that is currently exported for downstream processing in overseas countries. The proponent considers that the AUSI Iron Project would have a number of other significant benefits including:

- increased export earnings for the State;
- further utilisation of the natural gas resource of the region;
- creation of employment opportunities;
- flow-on economic growth of the region;
- establishment of value-added resource processing;
- provide potential for further downstream manufacturing; and
- creation and diversification of markets for WA iron ore.

The proponent also considers that the construction of a gas pipeline to service the AUSI Iron Project and other potential users would encourage the planning and development of the proposed Cape Lambert/Dixon Island Industrial Estate, which in turn would substantially increase economic opportunities and growth for the region and the State.

2.2 Summary of proposal.

The proposed additional infrastructure for the AUSI Iron Project will consist of the following:

- a railway spur line, to carry one train daily, from a point on Hamersley Iron Pty Limited's Dampier-Paraburdoo Railway approximately 2.5km south-east of Mount Prinsep to the DRI plant near Wickham;
- a gas pipeline, constructed with 40% excess capacity, which will extend from Main Line Valve 7 (MLV 7) on the Dampier to Perth Gas Pipeline to the DRI plant site. The pipeline will be located adjacent to Robe River Mining Company's Karratha to Cape Lambert gas pipeline and/or Pilbara Energy Pty Limited's Dampier to Port Hedland gas pipeline; and
- a load-out facility, which will transfer DRI from the plant to ships for export. This facility would comprise:
  - a covered conveyor from the north-eastern side of the DRI plant to a berthing jetty;
  - a berthing jetty;
  - a shallow channel requiring partial dredging approximately 250m wide, 1.0km long and to a depth of 8m below AHD; and
  - the AUSI Iron Project's desalination plant water intake and flushing water discharge points.

Table 1 below, details the capacity of the proposed infrastructure. Reference should be made to the proponent's CER for a detailed description of the proposal.

TABLE 1

SPECIFIC DETAILS OF THE INFRASTRUCTURE PROPOSAL

Infrastructure component	Proposal capacity
Railway spur line	6.3 x 10^6tpa iron ore
Gas pipeline	1.2 x $10^9$$m^3$pa gas with additional 40% capacity
Conveyor	3.6 x 10^6tpa
Berthing jetty	33000 tonnes dwt ship capacity
Shipping channel	8m dredged channel depth
Reverse osmosis desalination plant	16.2 x $10^6$$m^3$pa intake 7.3 x $10^6$$m^3$pa potable water produced 8.9 x $10^6$$m^3$pa discharged as flushing water

3. Identification of environmental issues

3.1 Method of assessment

The purpose of environmental impact assessment is to determine whether a proposal is environmentally acceptable or under what conditions it could be environmentally acceptable.

A set of administrative procedures has been defined (refer to flow chart in Appendix 1) in order to implement this method of assessment.

The first step in the method is to identify the environmental topics to be considered. A list of topics (or possible issues) is identified by the Environmental Protection Authority (EPA) through the preparation of guidelines which are referred to relevant agencies for comment prior to being finalised.

In the next main step these topics are considered by the proponent in the Consultative Environmental Review (CER) both in terms of identifying potential impacts as well as making project modifications or devising environmental management strategies.

The CER is reviewed by the Department of Environmental Protection (DEP) to ensure that each topic has been discussed in sufficient detail by the proponent prior to release for government agency and public comment. The submissions received as a result of public review are summarised by the DEP on behalf of the EPA. This process can add environmental topics which need to be evaluated in terms of the acceptability of potential environmental impacts.

Proponents are invited to respond to the topics raised in submissions. Appendix 2 contains a summary of the topics raised in submissions and the proponent's response to those topics. A list of submitters appears as Appendix 3. 9 submissions were received, of which 7 were from State and other government agencies, 1 was from a member of the public and 1 was from a private company.

The proponent's revised commitments following their response appears in Appendix 4.

This information, namely the guidelines, the proponent's CER, the submissions and the proponent's response, is then subjected to analysis for environmental acceptability. For each environmental issue, an objective is defined and where appropriate an evaluation framework identified.

The expected impact of the proposal, with due consideration to the proponent's commitments to environmental management, is then evaluated against the assessment objective. The EPA then determines the acceptability of the impacts. Where the proposal has unacceptable environmental impacts, the EPA can either advise the Minister for the Environment against the proposal proceeding or make recommendations to ensure the environmental acceptability of the proposal.

Limitation

This evaluation has been undertaken using information currently available. The information has been provided by the proponent through preparation of the CER document (in response to guidelines issued by the EPA), by DEP officers utilising their own expertise and reference material, by utilising expertise and information from other State government agencies, information provided by members of the public, and by contributions from EPA members.

The EPA recognises that further studies and research may affect the conclusions. Accordingly, the EPA considers that if the proposal has not been substantially commenced within five years of the date of this report, then any approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the EPA.

3.2 Public and agency submissions

Comments were sought on the proposal from the public, community groups, as well as local and State government agencies. During the public review period of 4 March 1996 to 1 April 1996, 9 submissions were received. A summary of these submissions was forwarded to the proponent's consultants, Dames & Moore, for response on behalf of the proponent.

Submissions received by the EPA fell into the following categories:

- 1 from an individual member of the public;
- 1 from a private company; and
- 7 from State and other government agencies.

The EPA has considered the submissions received and the proponent's response as part of the assessment of this proposal.

3.3 Review of topics

Twenty three topics were identified during the environmental impact assessment process, including those topics identified in the EPA's guidelines, subsequent consultations, and in the submissions described above. These were:

Biophysical

1. Transport impacts from shipping, particularly on the seabed.
2. Impacts of dredging activities on water quality, particularly from direct disturbance, sedimentation and turbidity, on light penetration, epiphyte growth, and benthic flora and fauna, including coral and sea grass, and their management.
3. Impacts of DRI spillages during vessel loading and unloading and the management of these impacts.
4. Impacts from ballast water contamination, their management and potential for the possible release of toxic spores and other propagules resulting from the disturbance of the seabed during shipping activities.
5. Impact on local fisheries, professional and amateur fishing and aquaculture operations.
6. Impacts from oil spillages.
7. Seasonal impacts due to the construction timetable, particularly on coral spawning and marine turtle nesting.

8. Impact of port on ocean water dynamics, including circulation, flushing and littoral dynamics.

9. Impacts on proposed marine parks and reserves.

10. Long term accumulation of heavy metals in sediments and biota as a consequence of the use of anti-fount paints, corrosion inhibitors and from the desalination plant discharge.

11. Impacts on aquatic fauna from light spill.

12. Impacts on marine biota resulting from the intake of ocean water and discharge of flushing water from the reverse osmosis desalination plant.

13. Impacts of dredge spoil disposal, including reclamation, on-shore spoil containment and management, spoil contamination, and ongoing requirements for spoil disposal.

14. Flood management and other impacts on surface water hydrology.

15. Impacts associated with reclamation work, jetty construction and beacons.

16 Construction details of proposed berths and other infrastructure, including proposed materials and their source, required quantity of fill, its source and borrow pits.

17. Impacts on terrestrial fauna and flora.

Pollution

18. Noise emissions from all potential sources.

19. Dust and particulate emissions from construction activities, ship loading operations, stockpiles, conveyors and transfer points.

20. Liquid and solid waste disposal, including hydrostatic test water and sullage.

21. Erosion control, materials management and rehabilitation.

Social surroundings

22. Risks and hazards, including those associated with the gas pipeline, the jetty and the handling of DRI, and the provision of adequate buffer separation.

23 Heritage areas.

These topics are considered and reviewed in conjunction with the characteristics of the proposal and the comments received, in order to identify the environmental issues requiring evaluation by the EPA.

The identification of issues is provided below and summarised in Table 2.

3.3.1 MARINE IMPACTS

Transport impacts from shipping, particularly on the seabed.

Proposal characteristics

Ongoing shipping activities are likely to disturb marine biota through sedimentation, physical obstruction and noise. Product shipping movements will be limited to three ships weekly.

Comments from government agencies

The Fisheries Department of Western Australia expressed concern about sea bottom disturbance resulting from ships turning and its potential impact.

Public comments

No specific comments received.

EPA consideration

The operation of vessels in controlled areas comes under the jurisdiction of various State and Federal authorities such as the Department of Transport. Control and management of shipping

activities is undertaken within these broader frameworks. Impacts from turbidity and sedimentation due to sea bottom disturbance resulting from ships turning and berthing is insignificant given the frequency of ship movements and in relation to the impact of single weather related events. Suspended loads in local waters are naturally high.

Notwithstanding the likely limited impact of this operational procedure, the matter of turbidity increase and sedimentation during the construction and operational phases of the project will require further evaluation by the EPA.

Impacts of dredging activities on water quality, particularly from direct disturbance, consequent sedimentation and turbidity, effect on light penetration and benthic flora and fauna.

Proposal characteristics

Dredging will cause both direct (physical destruction) and indirect disturbance to marine biota through an increase in turbidity, sedimentation, and decreased light penetration.

Comments from government agencies

The Australian Heritage Commission indicated that the project could impact upon on the marine environment around Dixon Island, particularly on corals, as a result of the need for regular dredging due to the active nature of the coast.

Public comments

No specific comments received.

EPA consideration

The physical destruction of benthic communities in the dredge path will occur. Short term indirect impacts can be anticipated in the local near-shore marine environment as a consequence of the initial dredging of the harbour basin and approach channels. It is anticipated that these impacts will be minimal as a consequence of the relatively small volume of spoil involved. Regular maintenance dredging of the harbour access will be required. Both indirect and direct impacts on water quality require further assessment by the EPA and accordingly are discussed in Sections 4.1 and 4.3 respectively.

Impacts of DRI spillages during vessel loading and unloading and the management of these impacts.

Proposal characteristics

Spillages of DRI may occur during vessel loading and unloading and may impact upon the marine environment. There will be no movement of other bulk or packaged commodities through the port.

Comments from government agencies

The Department of Environmental Protection expressed the following concerns:

- the impact of product dust on the marine environment has not been discussed; and
- safety aspects in the handling and shipping of DRI as detailed in Section 7.3.11.1 of the CER, particularly with respect to where responsibility lies if there is any environmental impact arising from an accident.

The Department of Transport (DOT) indicated that the proponent will be responsible for all operational matters in the port area associated with the facility and at all times shall comply with best port practice, particularly in relation to the loading of product.

Public comments

No specific comments received.

EPA consideration

This issue, together with the management of related impacts will require further evaluation by the EPA.

Impacts from ballast water contamination, their management and potential for the possible release of toxic spores and other propagules resulting from the disturbance of the seabed during shipping activities.

Proposal characteristics

Dredging and operational shipping movements will disturb the seabed which could facilitate the possible release of toxic spores and other propagules. Ballast water may be discharged by ships associated with the project. All ships will comply with International Marine Organisation (IMO) and the Australian Quarantine Inspection Service (AQIS) guidelines.

Comments from government agencies

The Department of Environmental Protection expressed concern about whether or not shipping operations will be co-ordinated by a port authority. The Department indicated that if this is so, then that authority should also be encouraged to adopt the latest Guidelines of the International Marine Organisation (IMO) and the Australian Quarantine Inspection Service (AQIS), and should maintain a watching brief on all shipping in respect of ballast water issues and practices.

The Fisheries Department of Western Australia expressed concern about the potential impacts caused by the introduction of nuisance organisms through ballast water discharge.

The Department of Transport (DOT) indicated that the proponent will be responsible for all operational matters in the port area associated with the facility and at all times shall comply with best port practice, particularly in relation to ballast water control.

Public comments

No specific comments received.

EPA consideration

Negligible impacts from the release of toxic spores and other propagules are likely to result from the disturbance of the seabed relative to other ports in the region. Ballast water discharge is controlled by the Australian Quarantine Inspection Service (AQIS) and local port authorities. There are no facilities in the Pilbara for the treatment of ballast waters at the proposed loading facility.

Accordingly, the issue of ballast water discharge for the proposal will require no further evaluation by the EPA. However, the matter of the lack of suitable provision for the management of ballast waters and ships' residues remains of concern to the EPA and will receive further consideration in Section 4.8.

Impact on local fisheries, professional and amateur fishing and aquaculture operations.

Proposal characteristics

Dredging and shipping movement controls will affect local fishing grounds. There is also a potential detrimental effect on the quality of recreational fishing and prawning through decreased availability of fish stocks.

Comments from government agencies

The Fisheries Department of Western Australia expressed concern about potential impacts on prawn and fish trawling operations and recreational fisheries from any significant loss or modification of marine biota through removal or contamination. Concern was also expressed about the effects of limiting access to prawn trawlers. The Fisheries Department commended the proponent for considering the situation of recreational fishers by stating that they are in favour of fishers using the load-out facility for mooring.

Public comments

No specific comments received.

EPA consideration

The proponent has engaged in consultation with local commercial and recreational fishing representatives. The selection of the load-out facility location will not affect the main trawling area which is located on the western side of Nickol Bay.

Aquaculture activities are situated toward the western end of Nickol Bay and the Burrup Peninsula. Given the separation between these activities and the likely zone of impact of the proposed infrastructure development, this matter will require no further evaluation.

The impact on local fisheries, professional and amateur fishing operations will require further evaluation by the EPA.

Impacts from oil spillages.

Proposal characteristics

Shipping activities increase the risk of oil spillages. No bunkering will take place on the proposed jetty. The proponent will develop an oil spill contingency plan.

Comments from government agencies

The Fisheries Department of Western Australia expressed concern about the potential impacts of oil and chemical spills on local fisheries.

The Department of Transport (DOT) indicated that the proponent shall comply with best port practice, particularly in relation to oil and chemical spills.

Public comments

No specific comments received.

EPA consideration

The proponent has made a commitment in the earlier assessment of the DR/HBI Plant (Bulletin 794) to prepare an oil spill contingency plan for the project prior to the commencement of operation. This commitment is reiterated in this project (commitment 11). As no bunkering is proposed for the facility there remains minimal potential for contamination from oil spillage.

The issue of the impacts from oil spillages will require no further evaluation by the EPA.

Seasonal impacts due to the construction timetable, particularly on coral spawning and marine turtle nesting.

Proposal characteristics

Long duration of construction may introduce potential seasonal impacts on marine biota.

Comments from government agencies

The Department of Environmental Protection expressed the following concerns, specifically that:

- coral spawning occurs in autumn and corals may be near the limits of their thermal tolerance in summer;
- turtles nest from late spring to early autumn;
- whether or not there are other marine biota which undergo periods of high environmental stress, and at what times of the year; and
- that on the available information, winter is the preferred period for dredging, and that the periods within a month of the coral spawning and turtle nesting should be avoided.

Public comments

No specific comments received.

EPA consideration

The long time frame associated with the construction of the new infrastructure may introduce potential seasonal impacts. This issue will require further evaluation by the EPA.

Impact of port on ocean water dynamics, including circulation, flushing and littoral dynamics.

Proposal characteristics

Development of the port facility has the potential to interrupt current flows and general circulation patterns. The selection of a pile and trestle design jetty will limit the disturbance to current flow and circulation. The solid fill causeway at the western side of Madigan Point does not extend beyond the promontory. Channel and turning bay construction is negligible.

Comments from government agencies

The Department of Environmental Protection expressed concern about the lack of detail presented in Section 4.4.4 of the CER in relation to local currents in Nickol Bay.

Public comments

No specific comments received.

EPA consideration

Further information was provided to the EPA regarding ocean water dynamics within the project area. In conclusion, the effect of port development of the nature proposed on ocean water dynamics, including circulation, flushing and littoral dynamics is unlikely to result in significant change. The causeway projection into the near-shore marine environment adjacent to Madigan Point will not project beyond the promontory and consequently is unlikely to significantly interrupt water movement. Design details for the loading jetty and causeway junction at Madigan Point are presented in Figure 4. The selection of a 15 m span piled and trestle design for the bulk of the structure will further minimise influences.

Consequently, no further evaluation is required.

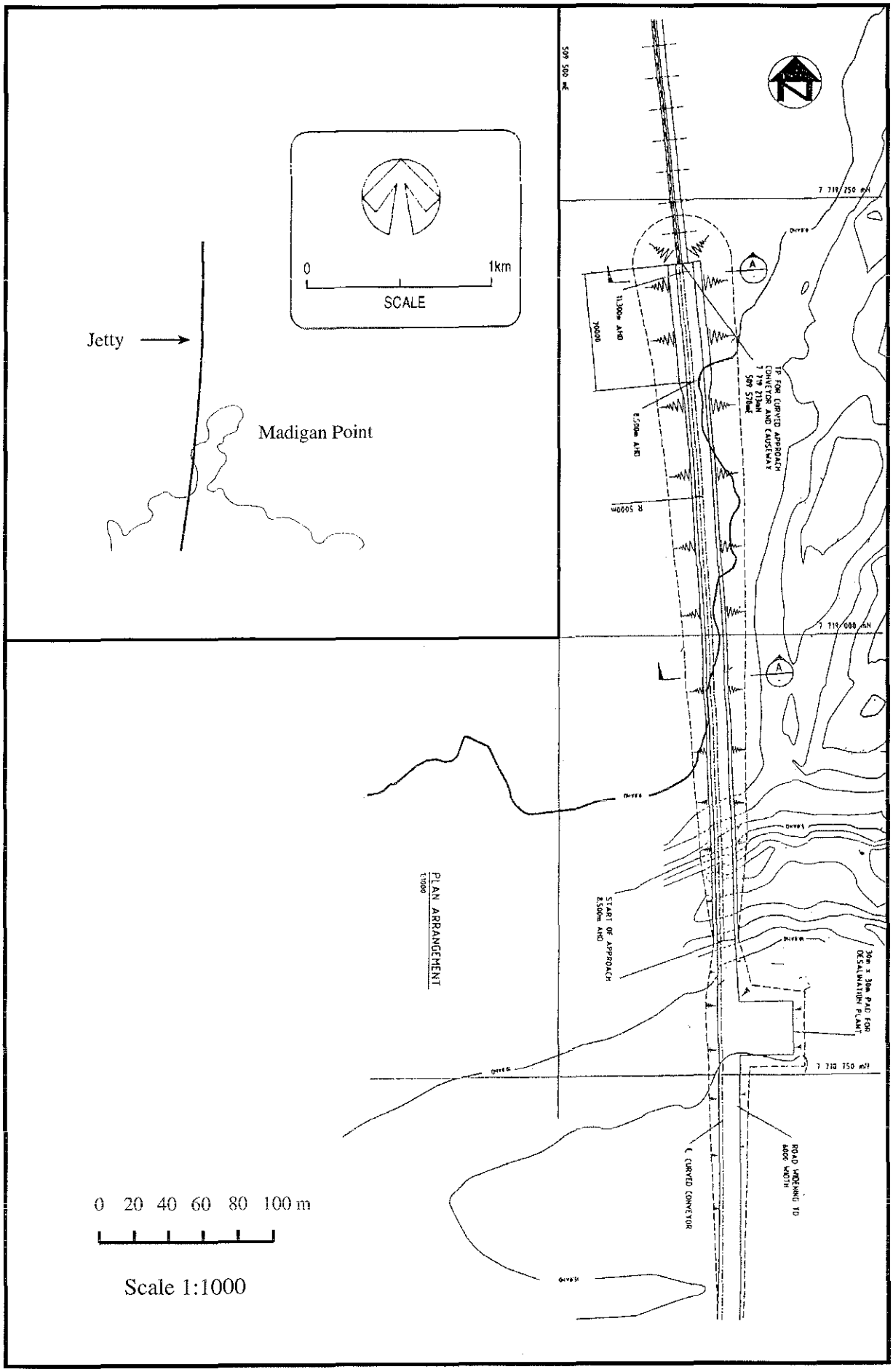


Figure 4. Proposed loading jetty and causeway junction - Madigan Point. (Source: Australian United Steel Ondustry P/L - preliminary design drawing)

Impacts on marine parks and reserves.

Proposal characteristics

Dixon Island was recommended for inclusion as a "B" class reserve in the System 8 *Conservation Reserves* document for the purpose of conservation of flora. An area to the north and west of Nickol Bay is recommended for inclusion as a marine reserve for the purposes of public recreation and the protection of flora and fauna in *A Representative Marine System for Western Australia* (CALM 1994). The relative locations of Dixon Island and the proposed marine reserve are indicated in Figure 5.

Comments from government agencies

The Australian Heritage Commission indicated that the project could impact upon on the marine environment around Dixon Island, particularly on corals, as a result of the need for regular dredging due to the active nature of the coast.

Public comments

No specific comments received.

EPA consideration

The proposed area of impact does not include Dixon Island nor any area proposed for reservation as a marine park. Hazards to the proposed marine reserve are limited to those of marine navigation. It is considered that, given the relatively small amount of dredging that will be required by this proposal, minimal sedimentation and disturbance can be anticipated amongst mangal communities fringing Dixon Island.

Consequently this matter will not be further assessed.

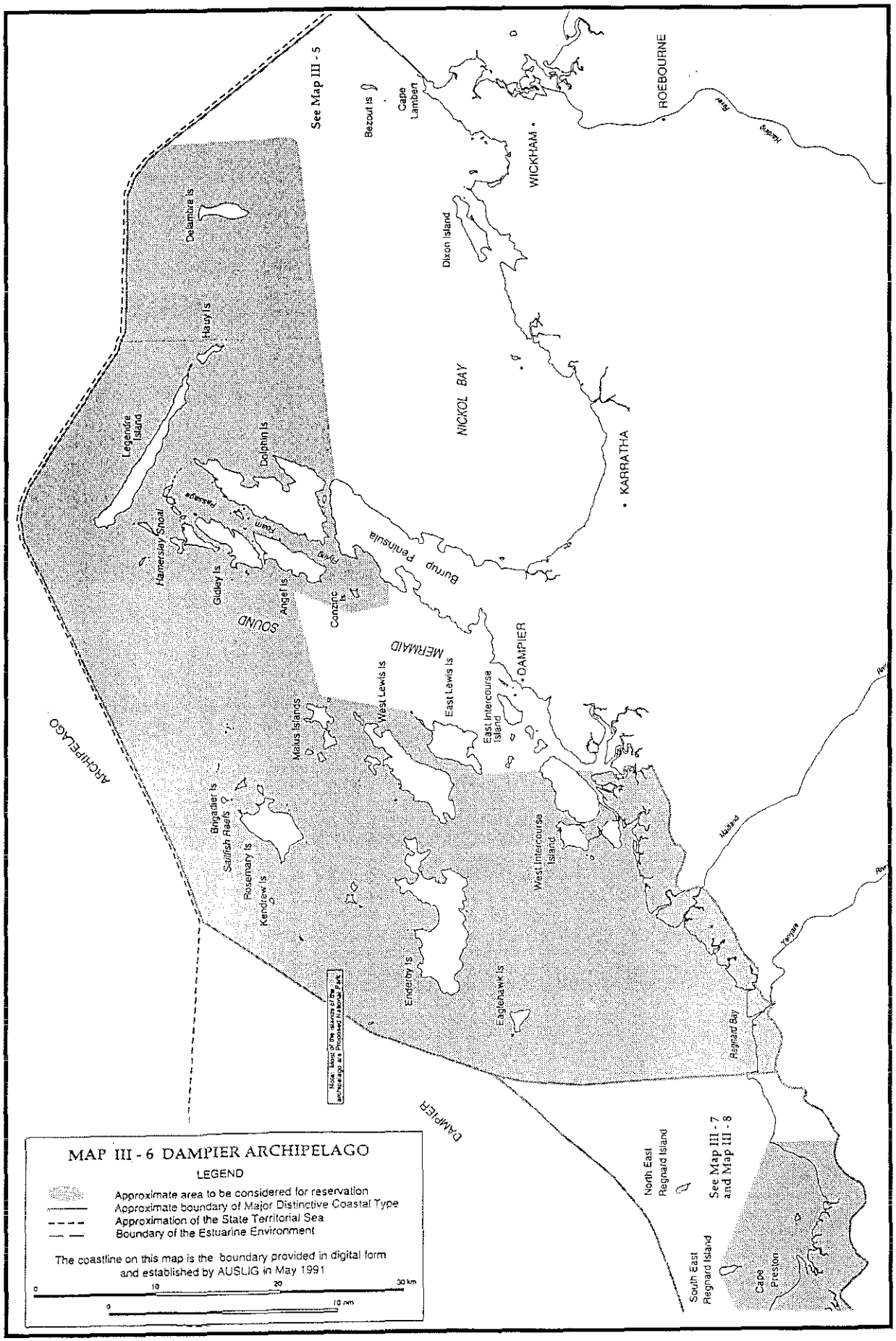


Figure 5. Relative location of the proposed jetty site to marine areas of regional significance. (Source: Map III-6 of A Representative Marine System for WA (CALM 1994))

Long term accumulation of heavy metals in sediments and biota as a consequence of the use of anti-fount paints, corrosion inhibitors and from the desalination plant discharge.

Proposal characteristics

Project development and operation could cause long term accumulation of heavy metals in sediments and biota as a consequence of the use of anti-foulant paints, corrosion inhibitors and from the desalination plant discharge.

Comments from government agencies

The Fisheries Department of Western Australia expressed concern about the possible impacts on local fisheries due to contamination of water and sediments by heavy metals.

The Department of Environmental Protection expressed the following concerns:

- the Tri-Butyl-Tin (TBT) regulations under the Environmental Protection Act prohibit coating fixed structures and pylons with TBT-based paints in bays and semi-enclosed waters; and
- the fact that one ship every three days may give rise to significant TBT contamination, although only monitoring will tell, and that the potential for contamination will be minimised if no ship/boat maintenance is allowed at the jetty.

The Fisheries Department of Western Australia expressed concern about the possible contamination of water and sediments by anti-fouling and anti-scaling agents and corrosion inhibitors.

The Department indicated that it would seem reasonable to expect the proponent to address this issue with a more specific programme of testing and monitoring aimed at keeping levels of these substances within appropriate guidelines (if available) rather than just stating their use would be minimised. The Department also indicated that this process would be made more straightforward if Environmental Quality Objectives existed for the region.

Additionally, the Fisheries Department indicated that, to assess this project adequately, it would be beneficial if the proponent provided more information on the composition of the anti-scalant and corrosion inhibitor and an indication of the quantities that will reach the marine environment.

Public comments

No specific comments received.

EPA consideration

The issue of long term accumulation of heavy metals in sediments and biota will require further evaluation by the EPA.

Impacts on aquatic fauna from light spill.

Proposal characteristics

Lighting from marine and near-shore infrastructure could affect aquatic fauna such as marine turtles.

Comments from government agencies

The Department of Environmental Protection indicated that one of the environmental objectives for the company should be to ensure the maintenance of the marine biological productivity and diversity identified by the consultants to the east of Madigan Point.

The Department of Conservation and Land Management (CALM) provided the following comments:

"Section 7.3.8 (Protection of Marine Fauna) states that the effect of light spill on turtles will be minimised through the design of the lighting system and the use of low pressure sodium lights. The proponent is encouraged to liaise with CALM prior to developing the lighting plan."

ANCA recommended that the potential impact on the marine wildlife in the area, including impacts on marine turtles and dugongs should be assessed. ANCA indicated that insufficient attention appears to have been given to potential impacts on the coastal and wetland environments and the species associated with them. ANCA also indicated that it was not satisfied with the level of environmental assessment and recommended that further investigations be carried out to determine the level of potential impacts on these environments and associated species.

The Department of Minerals and Energy's (DOME's) Mining Operations Division indicated that measures to prevent/minimise impacts on marine fauna should be clearly detailed in the EMP.

Public comments

No specific comments received.

EPA consideration

The issue of impacts on aquatic fauna, including the potential for light spill to affect marine turtles will require further evaluation by the EPA.

Impacts on marine biota resulting from the intake of ocean water and discharge of flushing water from the reverse osmosis desalination plant.

Proposal characteristics

The higher salinity and temperature of the discharged flushing water from the reverse osmosis desalination plant may affect the marine environment.

Comments from government agencies

The Department of Environmental Protection expressed the following views:

- that the proponent provide the DEP with a copy of the report produced by Weather News International, (1996), as there is insufficient information presented in the CER to gain an appreciation of the local currents and circulation patterns, and the basis for the hydrodynamic and dispersion modelling;
- whether or not there has been any comparison of field data and model results;
- whether or not the model is actually able to resolve the seasonal differences presented in Figure 7.1 of the CER;
- whether or not the environmental flow (due to tide and wind) and the local water depth is sufficient to prevent a local accumulation of effluent and to enable the jet/plume dilutions calculated by WNI to occur;
- the fact that satisfactory plume dilution is likely to occur as long as the 20m diffuser is oriented transverse to the tide and current flow;
- whether or not the discharge is likely to be mixed through the water column or be transported away from the area as a bottom layer after initial dilutions and plume fall;
- that the proponent should maintain a quality controlled contaminant inputs inventory (flowrate, concentration and load) for all contaminants discharged to marine waters;
- that the spatial scale as well as the temporal frequency of monitoring should also be agreed with the EPA/DEP; and
- that an initial baseline survey would be extensive enough to determine evidence of other sources of contamination and to select control sites.

The Department of Minerals and Energy's (DOME's) Mining Operations Division indicated that measures to prevent/minimise impacts on marine flora should be clearly detailed in the EMP.

Public comments

No specific comments received.

EPA consideration

The issue of impacts from the intake of ocean water and discharge of flushing water from the reverse osmosis desalination plant particularly in relation to the concerns raised by the DEP and DOME will require further evaluation by the EPA.

3.3.2 TERRESTRIAL IMPACTS

Impacts of dredge spoil disposal, including reclamation, on-shore spoil containment and management, spoil contamination, and ongoing requirements for spoil disposal.

Proposal characteristics

A shipping channel will be dredged and the spoil will be disposed of on land and be used for the construction of the overland conveyor causeway following suitable consolidation and armouring. Regular maintenance dredging will need to be undertaken. This matter is further considered in Section 4.1. There remains a potential for direct loss or impact to mangrove communities on the coastal fringe, silt transport through stream flow and for an increase in erosion.

Comments from government agencies

The Fisheries Department of Western Australia expressed concern about turbidity and smothering effects resulting from the return of dredge spoil waters.

The Department of Environmental Protection expressed the following concerns:

- the lack of information on the volume of dredge spoil required as fill for the overland conveyor and how this compares with the volume of dredge spoil involved in the capital dredging;
- the need to provide information on the expected frequency and volume of maintenance dredging, and what the proponent proposes to do with dredge spoil from maintenance dredging; and
- the need to provide information on what the proponent's 15 year maintenance dredging cycle is based on.

Public comments

No specific comments received.

EPA consideration

The proponent proposes to incorporate dredge spoil in the aggregate required for the construction of the causeway in support of the loading conveyor. The impacts of dredging and dredge spoil disposal especially as it relates to mangals will require further evaluation by the EPA.

Flood management and other impacts on existing surface hydrology.

Proposal characteristics

Flood management needs to be considered by the proponent, particularly where the new railway will traverse surface water features such as rivers, streams and flood plains. The new railway spur may modify the flow pattern of flood waters which in turn could intensify erosion and alter the size of the area that would normally be inundated during a flood event.

Comments from government agencies

The Department of Minerals and Energy's (DOME's) Mining Operations Division questioned the acceptability of the proponent designing the culverts, crossings and bridges along the railway spur to only accommodate a 1 in 50 year storm/flood event, when the area is prone to

cyclones. DOME questioned whether or not culverts, crossings and bridges should be designed to cope with a 1 in 100 year storm/flood event.

Public comments

No specific comments received.

EPA consideration

The issue of flood management and the likely impacts stemming from the alteration of surface water features by the new railway spur and other infrastructure will require further evaluation by the EPA.

Impacts associated with reclamation work, jetty construction and beacons.

Proposal characteristics

Project will involve construction of a load-out facility, berthing jetty, beacons and associated reclamation work.

Comments from government agencies

The Shire of Roebourne expressed concern at the continuing trend of individually owned, and operated port infrastructure related to specific resource projects. Should each development currently under consideration require individual facilities, significant cumulative effects are likely to occur. The Shire indicated that it was Council's view that this could only be overcome with State-developed port infrastructure.

Public comments

One public submission expressed concern about the loss of mangroves on the western side of Madigan Point.

EPA consideration

The Shire of Roebourne's concerns pertaining to port infrastructure duplication is a broader issue Government to resolve, and is further discussed in Section 4.9. The proponent has been unable to negotiate the use of existing infrastructure, and has made provision through the provision of additional capacity in their infrastructure for other users.

Impacts from reclamation work, jetty construction and beacons will require further evaluation by the EPA, especially as they relate to corals, benthic flora and fauna and mangal communities.

Construction details of proposed berths and other infrastructure, including proposed materials and their source, required quantity of fill and borrow pits.

Proposal characteristics

Construction of infrastructure requirements will require materials derived from regional resources such as borrow pits. Details will need to be provided in order for any potential impacts to be ascertained. Impacts will be managed through local government authority development approvals and Department of Minerals and Energy guidelines.

Comments from government agencies

The DEP expressed concern over the lack of information pertaining to the junction of the jetty and the causeway within the CER.

The Department of Minerals and Energy's (DOME's) Mining Operations Division indicated that Section 7.2.11.3 contains no information on the volume of material likely to be excavated from borrow pits, nor does it give any information on the likely numbers or size of borrow pits.

The Department of Transport (DOT) indicated that drawings and specifications of all works in the port area associated with the facility are to be submitted to the Department for approval prior to commencement of construction. The DOT also indicated that the proponent will be required to enter into a written agreement with the Department evidencing the terms and conditions for the use of the port.

Public comments

No specific comments received.

EPA consideration

No information on the volume, number and size of borrow pits was provided in the CER. However, the proponent will need to comply with the following DOME guidelines:

- Environmental Management of Quarries, Development, Operation and Rehabilitation Guidelines;
- Guidelines for Environmental Management of Mining in Arid Areas; and
- Guidelines for the Preparation of Annual Environmental reports as a Condition on Mining and General Purpose Leases.

The relevant information pertaining to borrow pits will be provided to DOME by the proponent when it implements the above guidelines. The information sought by the DOT is a matter to be resolved through discussions between the relevant parties, and satisfactory resolution would be a requirement of any statutory approvals to operate the port facility. Details pertaining to the junction of the jetty and the causeway have subsequently been provided (refer to Figure 4). Accordingly, this issue requires no further evaluation by the EPA.

Impacts on terrestrial fauna and flora.

Proposal characteristics

Construction will have both direct and indirect impacts upon terrestrial flora and fauna. Desktop studies of fauna and flora have been undertaken to present. A flora field study has been undertaken.

Comments from government agencies

The Australian Nature Conservation Agency (ANCA) expressed concern about the limited amount of field survey work for fauna and flora undertaken in the region. ANCA recommended that a thorough fauna field survey be undertaken, including threatened species listed in Schedule 1 of the Endangered Species Protection Act 1992 (ESP Act). ANCA suggested that further field survey work be carried out to determine the significance of the sandy plains and samphire flat habitat and possible impacts on migratory birds.

ANCA recommended that the proponent should closely consult wildlife experts within the Department of Conservation and Land Management (CALM), in order to identify potential impacts on the environment.

ANCA was also concerned about the CER concluding that because vertebrate species identified in the region have wide distributions throughout the Pilbara, they were not considered to be of particular significance. ANCA also pointed out that the proponent will need to ensure that Australia's obligations under the Japan-Australia and China-Australia Migratory Birds Agreements (JAMBA and CAMBA), the Convention on the Conservation of Migratory Species (Bonn Convention) and the Convention on Wetlands of International Importance (Ramsar Convention) are met.

The Department of Minerals and Energy's (DOME's) Mining Operations Division indicated that measures to prevent/minimise impacts on terrestrial fauna should be clearly detailed in the EMP.

Public comments

No specific comments received.

EPA consideration

The EPA considers that the flora field survey undertaken is satisfactory. However, the issue of potential impacts on terrestrial fauna due to the development of the additional infrastructure and the need for a fauna field survey will require further evaluation by the EPA.

3.3.3 POLLUTION IMPACTS

Noise emissions from all potential sources.

Proposal characteristics

Construction and operation of the new infrastructure will generate noise. The proponent will need to meet statutory requirements.

Comments from government agencies

The DEP expressed concern about the apparent anomaly between the CER indicating that the draft Environmental Protection (Noise) Regulations were utilised in the noise study undertaken by the proponent, and Commitment 6 which refers to compliance with the current Noise Abatement (Neighbourhood Annoyance) Regulations 1979. The DEP suggested that the proponent should clarify this anomaly.

The DEP recommended that, in relation to construction noise, the proponent should provide the following information, supplementary to the CER:

- predicted source sound power levels for typical construction machinery likely to be used;
- hours of operation of the construction works;
- predicted noise levels at the nearest noise-sensitive premises; and
- details of any noise emission specifications or restrictions on operating hours.

The DEP also recommended that Commitment 6, which refers to compliance with the requirements of the current regulations, should be revised to refer to the proposed Environmental Protection (Noise) Regulations.

The Department of Minerals and Energy's (DOME's) Mining Operations Division indicated that the proposed noise emission levels (outlined in Section 7.2.9.3) of 85dB(A) at a distance of 1m should satisfy its noise limits, provided that a tonal component of any noise generated by the plant is eliminated if practicable.

Public comments

No specific comments received.

EPA consideration

The issue of the provision of the additional information on noise sought by the DEP will require further evaluation by the EPA.

Dust and particulate emissions from construction activities, ship loading operations, stockpiles, conveyors and transfer points.

Proposal characteristics

The construction and operation of the new infrastructure will generate dust and particulate emissions. The product will be stored in silos as opposed to being stockpiled .

Comments from government agencies

The Department of Environmental Protection indicated that the impact of product dust on the marine environment has not been discussed.

Public comments

No specific comments received.

EPA consideration

The issue of dust and particulate emissions from construction activities, ship loading operations, stockpiles, conveyors and transfer points will require further evaluation by the EPA.

Liquid and solid waste disposal, including hydrostatic test water and sullage.

Proposal characteristics

The project will produce liquid and solid wastes comprising of building and packaging wastes, crib room and kitchen wastes and septage in volumes commensurate with the scale of activity being undertaken. Construction camps will be established.

Septage and solid waste disposal will need to comply with local government authority and Health Department of Western Australia requirements.

Pressure testing of gas pipeline sections will be required. Fresh water, which may contain inhibitors, will be introduced to the pipe sections for hydrostatic testing. Industry practice is for re-use of such waters where possible and for biodegradable additives to be used for pipe testing. Relatively small volumes of water are used for this purpose.

Comments from government agencies

The Shire of Roebourne indicated that all construction camps must comply with its Construction Camp Regulations, and details of waste disposal and potable water supply need to be addressed.

Public comments

No specific comments received.

EPA consideration

Adequate facilities exist in the Pilbara for the disposal of sanitary landfill and building waste as is likely to be generated from this project. The proponent will need to follow the appropriate regulations and requirements of the relevant local government authorities.

The EPA considers that hydrostatic test waters will be largely innocuous due to the biodegradability of the inhibitors and from the fact that only very small quantities of inhibitors will be used. Accordingly, no further evaluation by the EPA will be required on this aspect.

However there are no designated industrial waste disposal sites in the Pilbara. Given the area is the focus for industrial development at present and is likely to continue so in the future, this matter remains of concern to the EPA and will receive further consideration in Section 4.8.

Erosion control and materials management

Proposal characteristics

The gas pipeline and rail corridors traverse a number of land units, a number of which are susceptible to erosion. Surface waters containing a high particulate load may enter stream flow and the near shore marine environment.

Conveyor causeway fill will consist in part of dredge spoil.

Comments from government agencies

DEP is concerned at the potential to increase sediment load to creek-lines and near shore marine environment.

Public comments

No specific comments received.

EPA consideration

Particular soils which are more prone to erosion following disturbance, have been identified along the gas pipeline corridor. Landform types along the railway corridor are stable. This

issue will be managed through the identification of susceptible soils and appropriate stabilisation and rehabilitation. Dredge spoil will be used to supplement aggregate imported for the construction of the conveyor causeway resulting in the potential for erosional losses. Further evaluation by the EPA will be required.

3.3.4 SOCIAL SURROUNDINGS

Risks and hazards, including those associated with the gas pipeline, the jetty and the handling of DRI, and the provision of adequate buffer separation.

Proposal characteristics

Operation of the new infrastructure will introduce risks and hazards. Easements appropriate for the risk involved will need to be provided along the gas pipe-line.

The Department of Minerals and Energy's (DOME's) Mining Operations Division expressed concern about the new risks introduced by the handling and storage of DRI. DOME indicated that the proponent will need to make new commitments to prepare risk and emergency management plans for the DRI conveying system, and ship loading and embarkation. DOME also indicated that the proponent will need to prepare contingency plans for fire explosion risks involving vessels at the jetty.

Public comments

No specific comments received.

EPA consideration

The issue of risks and hazards, particularly in relation to the concerns expressed by the Department of Minerals and Energy's (DOME's) Mining Operations Division for additional commitments and contingency plans to be made by the proponent, will require further evaluation by the EPA. Consideration of adequate separation will need to be given in current land zonings and in future land planning decisions by other decision makers.

Heritage areas.

Proposal characteristics

The project may affect areas of significance to Aboriginal Heritage. The presence of existing sites has been considered and incorporated into the design.

Comments from government agencies

The Australian Heritage Commission indicated that the cultural significance of nearby islands, which are listed in the Register of the National Estate as part of the Islands from Dixon to Cape Keraudren listing, has not yet been assessed.

Public comments

One public submission expressed concern about the potential impact to Aboriginal Heritage areas. Of particular concern was the possible restriction of access to areas surrounding Madigan Point which have traditionally been used by Aboriginal people to collect food from the marine environment. This submission pointed out that the loss of mangroves around Madigan Point would compound this problem as it would result in the loss of some of this resource. The submission put forward two suggested alternative routes for the conveyor which would bypass Madigan Point and therefore eliminate any potential impact on heritage areas.

EPA consideration

The proponent has selected the route of the conveyor to avoid areas around Madigan Point which are of significance to Aboriginal people. Dixon Island will not be directly affected. Nevertheless, the EPA understands that the proponent will need to satisfy the requirements of the Aboriginal Heritage Act (1972-1980). No further evaluation by the EPA is required.

Table 2 Identification of environmental issues requiring EPA evaluation.

Topics	Proposal Characteristic	Comments From Government Agencies	Public Comments	Identified Issues
Biophysical				
Transport impacts from shipping, particularly on the seabed.	Shipping movements may impact upon the environment.	Impacts from sea bottom disturbance caused by ship turning.	None received.	Transport planning issues to be resolved by the relevant State and Federal government authorities. Turbidity and sedimentation effects require further EPA evaluation.
Impacts of dredging activities on water quality, particularly from direct disturbance and consequent sedimentation, effect benthic flora and fauna.	Dredging will cause direct loss of benthic flora and fauna, an increase in turbidity, sedimentation and decreased light penetration.	Direct loss of benthic infauna, impacts on corals around Dixon Island, from dredging required likely due to the active nature of the coast.	None received.	Impacts on water quality, particularly from sedimentation and turbidity, on light penetration, epiphyte growth, coral, sea grasses and their management will require further EPA evaluation.
Impacts of DRI spillages during vessel loading and unloading, and the management of these impacts.	Spillages of DRI may occur during vessel loading and unloading.	Impact of product dust on marine environment not discussed. Not clear where responsibility lies if any environmental impact arises from accidents and spillages. Proponent to use best port practice during loading of product.	None received.	Impacts of DRI spillages during vessel loading, unloading and the management of impacts will require further EPA evaluation.
Impacts from ballast water contamination, their management and potential for the possible release of toxic spores and other propagules resulting from the disturbance of the seabed during shipping activities.	Ballast water may be discharged by ships associated with the project. All ships will comply with IMO and AQIS guidelines. Dredging and shipping movements will impact on the sea floor.	Shipping operations should be co-ordinated by a port authority. That port authority should adopt latest IMO and AQIS Guidelines. Concern about the introduction of nuisance organisms in ballast water. Proponent to use best port practice.	None received.	Negligible impacts from the release of toxic spores and other propagules are likely to result from the disturbance of the seabed relative to other ports in the region. No further evaluation required.
Impact on local fisheries, professional and amateur fishing and aquaculture operations.	Dredging and shipping movement controls will affect local fishing grounds and aquaculture operations.	Loss or modification of marine biota by removal or contamination may affect local fisheries. Access for prawn trawlers may be affected by jetty and ship loader.	None received.	Impact on local fisheries, professional and amateur fishing and aquaculture operations will require further EPA evaluation.
Impacts from oil spillages.	Shipping activities increase the risk of oil spillages. No bunkering will take place on the proposed jetty. Proponent will develop oil spill contingency plan.	Concern about impacts of oil and chemical spills on local fisheries. Proponent to use best port practice in relation to oil/chemical spills.	None received.	No further evaluation of the impacts of oil spillages necessary.
Seasonal impacts due to the construction timetable, particularly on coral spawning and marine turtle nesting.	Long duration of construction may introduce potential seasonal impacts.	Details of biota other than coral and turtles that may suffer seasonal impacts required. Dredging to be avoided within a month of coral spawning and during the turtle nesting period.	None received.	Seasonal impacts due to the construction timetable, for example coral spawning, marine turtle nesting requires consideration and further EPA evaluation.
Impact of port on ocean water dynamics, including circulation, flushing and littoral dynamics.	Port structure and dredging may affect ocean water dynamics. However piled construction and minimal dredging will limit such disturbance.	Concern over lack of information about local currents.	None received.	Impact of port development on ocean water dynamics, including circulation, flushing and littoral dynamics is unlikely to be significant by virtue of open design and distance to sensitive habitats. No further evaluation required.
Impacts on proposed marine parks and reserves.	Dredging and shipping may have no direct effects on Dixon Island and the proposed Marine Part to the north and north east. Significant impacts beyond normal navigation hazards are unlikely	None received.	None received.	Impacts on marine parks and reserves require no further evaluation.
Long term accumulation of heavy metals in sediments and biota as a consequence of the use of anti-foulant paints, corrosion inhibitors and from the desalination plant discharge.	Project development and operation could cause long term accumulation of heavy metals in sediments and biota.	Shipping may cause TBT contamination. Concern about contamination of water and sediments. Details of composition of compounds and quantities to be discharged required.	None received.	Long term accumulation of heavy metals in sediments and biota requires further EPA evaluation.
Impacts on aquatic fauna from light spill.	Lighting from marine and near-shore infrastructure could affect aquatic fauna.	Proponent to liaise with CALM prior to developing light plan. Measures to limit impacts on aquatic fauna to be detailed in the EMP. Impact on marine turtles and dugongs should be assessed. Further investigations required to assess impacts.	None received.	The issue of impacts on aquatic fauna, including the potential for light spill to affect marine turtles, requires further EPA evaluation.
Impacts on marine biota resulting from the intake of ocean water and discharge of flushing water from the reverse osmosis desalination plant.	Higher salinity and temperature of discharged flushing water may affect the marine environment.	Measures to prevent/minimise impacts on aquatic flora should be clearly detailed in the EMP. Concerns about lack of information in CER and accuracy of modelling.	None received.	The issue of impacts on aquatic vegetation and flora from the intake of ocean water and discharge of flushing water needs to be further evaluated by the EPA.
Impacts of dredge spoil disposal, including reclamation, on-shore spoil containment and management, spoil contamination, and ongoing requirements for spoil disposal.	A shipping channel will be dredged and the spoil will be disposed of on land. Regular maintenance dredging will need to be undertaken.	Details of dredge spoil volume and frequency of maintenance dredging.	None received.	Impacts of maintenance dredging and dredge spoil disposal, especially as it relates to mangals, will require further EPA evaluation.
Flood management and other impacts on existing surface hydrology.	Conveyor, railway embankment and other infrastructure may impact on flood levels or impede flows. Gas pipe buried at river crossings.	Concern over culverts, crossings and bridges being designed for a 1 in 100 year storm/flood event instead of a 1 in 50 year event.	None received.	Flood management and surface hydrology modification requires further EPA evaluation.
Impacts associated with reclamation work, jetty construction and beacons.	Project will involve construction of a load-out facility, berthing jetty, beacons and associated reclamation work.	Roebourne Shire expressed concern at the continuing trend toward infrastructure developments by individual companies. Considers this could be overcome by development of public facilities	Concern about loss of mangroves on the western side of Madigan Point.	Impacts from reclamation work, beacons, breakwater structures requires further evaluation, especially as they relate to corals, flora and fauna and mangal communities.
Construction details of proposed berths and other infrastructure, including proposed materials and their source, required quantity of fill and borrow pits.	Construction details will need to be provided in order for any potential impacts to be ascertained. Impacts managed through LGA development approvals & DME guidelines.	No details of volume, number and size of borrow pits. Not clear from diagrams where causeway stops and jetty starts.	None received.	Proponent will need to comply with DOME guidelines. Port area details to be resolved with DOT. Causeway and jetty details subsequently provided to DEP. No further EPA evaluation required.
Impacts on terrestrial fauna and flora	Construction will have both direct and indirect impacts upon terrestrial fauna and flora. Desk study complete.	Lack of field surveys. Proponent should consult with CALM to identify potential impacts. Measures to prevent/minimise impacts on terrestrial fauna should be clearly detailed in the EMP. Concerns about impacts on migratory birds.	None received.	Impacts on terrestrial fauna and flora requires further EPA evaluation.
Pollution				
Noise emissions from all potential sources.	Construction and operation of the new infrastructure will generate noise. Proponent will need to meet statutory requirements.	Additional information required by the DEP. Should satisfy DOME's noise limits provided that tonal components are eliminated.	None received.	Additional information required by the DEP requires further EPA evaluation.
Dust and particulate emissions from construction activities, ship loading operations, stockpiles, conveyors and transfer points.	Construction and operation of the new infrastructure will generate dust and particulate emissions.	The proponent should address the potential for dusting of the DRI and how impacts on the marine environment can be managed.	None received.	Dust and particulate emissions will require further EPA evaluation.
Liquid and solid waste disposal, including hydrostatic test water and sullage.	The project will produce liquid and solid wastes. Test waters for pipe testing may contain a biodegradable inhibitor, although in relatively small volumes. Waste waters to comply with local government authority regulations and requirements. Construction camp to comply with Construction Camp Regulations.	Provision of waste disposal details for construction camp. Proponent must follow Construction Camp Regulations.	None received.	The proponent will need to follow the appropriate regulations and requirements of the relevant local government authorities. The EPA considers that hydrostatic test waters will be largely innocuous due to the biodegradability of the inhibitors and from the fact that only very small quantities of inhibitors will be used. No further EPA evaluation required.
Erosion control and materials management.	Gas pipeline and rail corridors traverse a number of land units, a number of which are susceptible to erosion. Conveyor causeway aggregate will consist in part of dredge spoil.	DEP concerned at potential to increase sediment load in to creek-lines and near shore marine environment.	None received.	Particular soils more prone to erosion following disturbance, specifically along the gas pipeline corridor. Railway corridor soils stable. Issue to be managed through identification of susceptible soils and appropriate stabilisation and rehabilitation. This issue requires further EPA evaluation.
Social Surroundings				
Risks and hazards, including those associated with the gas pipeline, the jetty and the handling of DRI, and the provision of adequate buffer separation.	Operation of the new infrastructure will introduce risks and hazards. The new infrastructure is remote from other land uses. However consideration to adequate separation will need to be given in future land planning decisions	Concern about the new risks introduced by the handling and storage of DRI. New commitments required for DRI conveying system and ship loading and embarkation. Contingency plans required for fire explosion risks.	None received.	Proponent must comply with DOME and International Marine Organisation Regulations (1991) requirements for risk management and DRI handling. Need for new commitments and contingency plans requires further EPA evaluation.
Heritage areas.	The project may affect areas of significance to Aboriginal heritage. Presence of existing sites has been considered and incorporated in the design.	The cultural significance of nearby islands has not been assessed.	Concern about heritage site impact, particularly around Madigan Point. Alternative routes for conveyor suggested.	This project will need to satisfy the requirements of the Aboriginal Heritage Act (1972-1980). No further EPA evaluation required.

4. Evaluation of environmental issues

The Environmental Protection Authority has considered the topics raised during the environmental impact assessment process including matters identified in public submissions. The Environmental Protection Authority believes the environmental issues requiring evaluation are as follows:

- turbidity, sedimentation and associated impacts on the marine environment;
- marine pollution and impacts on water quality;
- maintenance of marine function and mangrove protection;
- protection of terrestrial flora and fauna;
- impacts on existing surface hydrology;
- pollution issues, comprising dust and particulate emissions and noise;
- other issues such as the provision of appropriate landfill , shared infrastructure and mechanisms for the management of ballast waters; and
- risks and hazards;

Biophysical issues

4.1 Turbidity, sedimentation and associated impacts on the marine environment

4.1.1 Objective

The Environmental Protection Authority's objective is to protect the marine environment from potential impacts associated with turbidity, sedimentation and other impacts caused by dredging activities and the construction and operation of near shore and marine based infrastructure.

4.1.2 Evaluation framework

Existing policy framework

The proposal would need to meet the requirements of the New Horizons In Marine Management Strategy - Government of Western Australia (November, 1994) and the Bonn Convention .

Technical information

Dixon Island and Islands of the Dampier Archipelago have been identified as being of particular importance. Figure 4, modified from CALM 1994, indicates the relative location of the proposed jetty site to marine areas of regional importance.

Sedimentation and the effects of turbidity can result in indirect effects on benthic organisms. Mobile sediments can cover sessile animals, and increased turbidity can modify light regimes such that seagrass beds become transitional or die. These processes may be the result of short duration intense events of anthropogenic origin (eg dredging), as a consequence of natural events such as cyclonic activity, or may result over longer periods of time following the liberation of sediments as a result of disturbance.

Sedimentation and turbidity increases can result from a number of activities associated with this project. These include:

- indirect effects of dredging the harbour channel and turning circle;
- indirect effects of maintenance dredging and potential sea disposal of dredge spoil;
- indirect effects of construction of the loading jetty;
- indirect effects of ship movements during the operation phase of the project;
- dust spillage from the loading operations associated with the operating phase of the project is considered further in Section 4.2; and
- increased turbidity of stream flow discharging into the near shore marine environment as a consequence of land disturbance associated with the construction phase of the project, as reviewed in Section 4.3.

Sedimentation during dredging operations

The CER stated that the use of a cutter suction dredge discharging spoil onshore will produce very little turbidity at the cutter head. The operation of the cutter suction dredge is such that the sediments loosened by the cutter head are drawn into the spoil intake pipe in much the same manner as a vacuum cleaner operates. The spoil, comprising a slurry of sediments of all sizes combined with seawater, passes through the dredge pump into a discharge pipe through which it is conveyed to the onshore disposal site. The dredge operators have estimated that less than 0.1% of the volume of material dredged would be dispersed into the ocean.

A conservative estimate of the spoil dispersed into the ocean as a consequence of the shipping channel and turning circler construction is 125 t which equates to a rate of 1.4 tonnes daily over the three month dredging period. Once disturbed, the sediment enters the water column and is transported by wind and tidal currents. The distance the sediment travels before settling onto the sea floor will depend on the strength of the prevailing currents and the mass (or size) of the particles, with the finest particles possibly carried for distances of up to several kilometres.

Dispersion modelling for the proposed dredging area has been carried out to determine the time of year when there would be least impact from dredging on Dixon Island and the mainland. The model results indicate that winter has slightly better offshore dispersal than either spring or autumn.

Corals and other biotic assemblages have the potential to be affected by sedimentation caused by dredging operations. Turbidity limits coral growth by decreasing light penetration in the water column and can result in mortality. Reduction in light penetration also encourages growth of epiphytes on corals which further reduces light and contributes to mortality.

Studies conducted in relation to dredging undertaken in Mermaid Sound for the Woodside LPG Project have shown that sedimentation has a measurable although relatively minor effect on coral numbers and percentage cover. These studies further indicated that rates of sedimentation returned to normal levels within three weeks of dredging being completed. Information obtained on coral health and mortality showed that short to mid term coral mortalities due to dredging plumes were minor and spatially limited to locations less than 1.5km from the dredging site.

Surveys undertaken by the proponent indicate poor coral coverage and representation to the west of Madigan Point relative to the east. The effect of disturbance to marine biota through sedimentation associated with dredging of the shipping channel is expected to be minimal due to the low biological productivity and the low silt content observed in the area to be dredged. Studies elsewhere in Dampier indicate that burrowing infauna disturbed during dredging quickly recolonise dredge sites due to the presence of a softer substrate.

Effects attributable to dredging operations can be reduced if operations are undertaken during winter, with autumn and spring as next preferred seasons. The use of a cutter suction dredge disposing of spoil directly to the land is predicted to reduce turbidity increases as a consequence of the activity. The CER states that dredging operations will be further discussed in the EMP.

Increased turbidity during jetty construction

Corals and other biotic assemblages have the potential to be disturbed through localised turbidity generated during the construction of the causeway and pile driving activities associated with jetty construction. Death of biota within the alignment, particularly the causeway section, is unavoidable but has been reduced through the selection of a piled trestle jetty structure from a point approximately mid-way along Madigan Point. Disturbance to biota occurring immediately in the jetty alignment is expected to be insignificant, as a survey of the area has shown it to be of low productivity due to a compacted sand substrate capable of supporting only minimal burrowing infauna.

Operational shipping impacts

The area of seabed with the greatest potential to be disturbed is the ship turning circle. Siltation effects and disturbance to marine biota as a result of ship movements is expected to be small as a biological survey of marine infauna within the proposed turning and channel sites has identified low biological activity.

Studies conducted in relation to sedimentation associated with shipping pathways for the Woodside LPG Project have concluded that seabed damage from cyclonic events greatly exceeds the minor effect of shipping induced turbidity. Woodside shipping, both in tonnage and frequency, is far in excess of that anticipated for this project.

Comments from key government agency

The Department of Environmental Protection (DEP) expressed the following concerns:

- the need to provide information on the expected frequency and volume of maintenance dredging, and what the proponent proposes to do with dredge spoil from maintenance dredging;
- the need to provide information regarding the basis upon which the proponent's 15 year maintenance dredging cycle is based;
- that the proponent provide the DEP with a copy of the report Weather News International (WNI), (1996) (subsequently provided), as there is insufficient information presented in the CER to gain an appreciation of the local currents and circulation patterns, and the basis for the hydrodynamic and dispersion modelling undertaken to determine dredge spoil dispersion patterns;
- whether or not there has been any comparison of field data and the WNI model results;
- whether or not the WNI model is actually able to resolve the seasonal differences presented in Figure 7.1 of the CER;
- that one of the environmental objectives for the company should be to ensure the maintenance of the marine biological productivity and diversity identified by the consultants to the east of Madigan Point;
- the fact that coral spawning occurs in autumn and corals may be near the limits of their thermal tolerance in summer and that turtles nest from late spring to early autumn;
- whether or not there are other marine biota which undergo periods of high environmental stress, and at what times of the year; and
- that on the available information, winter is the preferred period for dredging, and that the periods within a month of the coral spawning and turtle nesting should be avoided.

4.1.3Public Submissions

No public submissions were received.

4.1.4Proponent's response

In response to the issues detailed in the DEP's submission, the proponent provided the following comments:

"The engineering studies that have been completed indicate that all of the dredge spoil from the initial dredging (250,000m^3) would be utilised within the overland conveyor."

"As indicated in response to Question 1.8, the CER states that the estimated frequency of maintenance dredging is once every 15 years. The frequency of 15 years has been estimated by the Proponent's Engineering Contractor and is based on the available information for the area. The Proponent has not yet conducted the detailed engineering studies to quantify the volume of dredge spoil that will be created by the maintenance dredging. Prior to the first maintenance dredging operation being undertaken the Proponent will review its options regarding the disposal of the dredge spoil to ensure that current (at the time of the dredging) environmental procedures are applied to its disposal."

"Section 7.3.1 of the CER stated that the results of the marine biological survey were used during the selection of the final site for the load-out facility. On the basis of the marine survey the Proponent chose to relocate the proposed location of the load-out facility from the east side of Madigan Point to the west side. The major aim of this relocation was to minimise the potential impacts of the Project on the marine environs to the east of Madigan Point."

"The marine biological survey undertaken in the vicinity of the Project Area did not show any other marine biota which regularly undergo periods of high environmental stress. However, it is likely that thermal stress also affects other organisms during summer. The actual location of the load-out facility was chosen to minimise the potential environmental impacts of the Project on the receiving environment and the marine survey showed that these areas had very little marine life. The Project will not affect any sandy beaches used for turtles during nesting."

"Commitment 8 of the CER states that the Proponent will preferably undertake the dredging operations in the winter months. However, from a marine impacts point of view, the Proponent believes that the dredging operations can also be undertaken during autumn and spring."

"WNI utilised field data for the region to verify the estimated current flows in the area and the estimated currents were used in the dispersion modelling. The Proponent is not aware of any comparison between field data and model results in relation to the dispersion model in the Project Area. However, the development of a model requires a process of evaluation and comparison and WNI (sub-consultants for this work) utilised an accepted and validated model."

"WNI estimated the current movements (including tidal and wind driven) based on its knowledge and data available in the vicinity of the Project Area over the period of one year. These estimated currents were used to predict the seasonal differences presented in Figure 7.1 of the CER."

"The potential for dredging activities and ship turning to affect the local marine habitats was discussed in Sections 7.3.2 and 7.3.11.5 respectively. The CER concluded that the potential impacts of the dredging operations would be minimised through the use of a cutter suction dredge and preferably undertaking the dredging during the winter months. It was also concluded, on the basis of existing information, that the impacts associated with ship turning were expected to be minimal."

Commitments made by the proponent

With respect to turbidity, sedimentation and other associated impacts, the proponent has made the following environmental commitment (refer to Appendix 4 for full list of commitments):

8. Dredging operations will be conducted preferably during winter, with autumn and spring the next preferred seasons, to minimise sedimentation to the reasonable satisfaction of the Department of Transport and the EPA. [Timing - Construction phase].

4.1.5Evaluation

Following advice from the DEP, the Fisheries Department of WA, CALM, DOME, AHC and ANCA, and the proponent's response to questions raised, the EPA considers that this issue can be managed within the context of this project.

The EPA understands that the proponent will prepare an Environmental Management Programme (EMP) for this particular project which will integrated into the EMP required by the EPA in its assessment report for the AUSI Iron Project DR/HBI Plant (Bulletin 794). In effect, the EMP for the AUSI Iron Infrastructure Requirements Project will supplement the EMP required by Bulletin 794.

Accordingly, the EPA recommends that the proponent should prepare a two stage EMP to supplement that which was a requirement of the Environmental Protection Authority's earlier assessment of the AUSI Iron Project, as detailed in Bulletin 794. This EMP, shall include the following information with respect to dredging, to the satisfaction of the EPA on advice from the DEP (Recommendation 2):

Stage 1 - before commissioning, the EMP shall address, but is not limited to the following:

- maintenance dredging requirements for the shipping channel, including volume and frequency of dredging and methods of dredge spoil disposal.

The EPA recommends (Recommendation 2) that reports of the results of the monitoring programme should be submitted annually to the DEP for audit, and that they should be made publicly available.

The EPA recommends (Recommendation 3) that all dredging be undertaken in accordance with best industry practice in order to reduce impacts on the environment. Furthermore, all dredging should be undertaken during winter or otherwise to the satisfaction of the EPA on advice from CALM. The EPA understands that in relation to maintenance dredging and the possible future need to dump dredge spoil at sea, the proponent would need to seek and obtain approval from the Commonwealth EPA. Furthermore, the proponent would also need to accord with the Commonwealth Environment Protection (Sea Dumping) Act (1981).

4.2 Marine pollution and impacts on water quality

4.2.1 Objective

The Environmental Protection Authority's objective is to protect the marine environment from potential impacts associated with the discharge of the reverse osmosis desalination plant flushing water, anti-foulant and anti-scalant compounds, heavy metals, corrosion inhibitors, ballast water and DRI spillages.

4.2.2 Evaluation framework

Existing policy framework

The proposal would need to meet the requirements of:

- the National Water Quality Management Strategy - Australian Water Quality Guidelines for Fresh and Marine Waters': Australia and New Zealand Environment; and
- the Conservation Council (1992) and Control of Organotin Antifouling Paint (EPA 1991)

Technical information

Acute and sub-lethal effects on marine biota can result from the planned or accidental release of a range of chemicals, or can result from the introduction of foreign organisms which out compete or are directly toxic to those natural to the area. The method by which these pollutant

enter the food chain can be varied. Impacts can also result from the timing of the release or impact.

This section brings together a number of issues that were raised in Section 3. They include:

- contamination from the release of heavy metals, anti-foulants, anti-scalant and corrosion inhibitors;
- desalination plant flushing water discharges; and
- DRI spillages.

Exotic organisms transported in ship ballast are managed through international agreements and will not be further discussed here.

Heavy metal, anti-foulant, anti-scalant/corrosion inhibitor contamination

As described in the proponent's CER, contamination of ocean sediment, and consequently to marine organisms, may occur at the proposed jetty site as a consequence of:

- low concentrations of heavy metal present in the desalination plant flushing water discharge;
- anti-scalants added to the desalination plant water to prevent scaling;
- heavy metal concentrations from the cathodic protection system used for corrosion protection on the jetty; and
- organic compounds present in anti-foulant paints used on ships and submerged structures.

Heavy metal and organic compound contamination of ocean sediment is expected to be small as:

- the desalination plant flushing water intake and discharge will be pumped through plastic or cement lined pipes to reduce corrosion and metallic contamination.
- The design of the desalination plant is such that there would be no heavy metal contamination of the flushing waters from the plant;
- the use of anti-scalants in the desalination plant water would be controlled through metered dosing;
- on the basis of 30,000t ships being used to export the DRI, an average of one ship every three days will be required when the plant reaches its full capacity of 3.6Mtpa. The low frequency of ships entering the area would present low potential for contamination of the sediments by anti-foulant paints; and
- the use of corrosion inhibitors on the jetty would be controlled.

To ensure the ocean environment is not being contaminated as a result of their operation, the Proponent will undertake an ongoing sediment monitoring programme to periodically test for heavy metals, anti-scalants and the organic compounds likely to be discharged as a consequence of their operations. Monitoring will commence prior to construction and will be conducted on sediment samples collected in, and adjacent to, the ship turning basin, shipping channel and jetty.

Reverse osmosis desalination plant flushing water discharge

The desalination plant will discharge approximately 1,000m^3 per hour (average discharge) with a peak discharge of approximately 1 250m^3 per hour of flushing water from a diffuser on the jetty. A description of the desalination process is provided in section 3.3.6 of the CER. Of the seawater input to the desalination plant, 45% will be used by the project as fresh water. The remaining 55% will be discharged into the ocean at an anticipated salinity concentration of slightly less than twice that of normal seawater (65g/L). The discharge temperature will be at or slightly above (1°C) ocean temperature.

The reverse osmosis process, likely to be used for the desalination plant, is such that the risk of contamination by heavy metals or other toxicants is low and the water will be pumped through plastic or cement lined pipes to reduce corrosion and metallic contamination.

The modelling of flushing water impact on the marine environment has been undertaken and indicates that the desalination plant discharge will be diluted to 1g/L above background within a few metres of the discharge point, and that the concentration on the ocean floor would not exceed that level.

In comparison, bitterns (hypersaline disharges from salt) into the ocean by the solar salt industry off the Pilbara coast, are at approximately 360g/L total dissolved salt (ie 10 times seawater, and intermittent discharges from this source have had no reported impacts on mangroves on the adjacent coastline or on fauna in adjacent waters.

Pelagic (free swimming) organisms are able to detect changes in salinity and avoid areas in which water quality may prove injurious to health and therefore should not be affected.

The CER indicated that the proponent proposes to discharge the flushing water through a diffuser which would be located towards the seaward end of the jetty, and be designed to discharge the flushing water at or just below the water surface. This method and location for disposal will limit or eliminate impacts on coastal and marine flora such as mangroves.

The CER also stated that it is proposed that the desalination plant ocean water intake will be installed along the jetty to minimise any additional construction impacts.

DRI spillages

If any DRI should fall into the ocean, it will quickly oxidise to form iron oxide. Other minor components of the product include oxides of calcium, magnesium and silicon which are natural components of seawater and marine sediments.

The nature of the materials handling system and specific features proposed are such that spillages are expected to be low. DRI is reactive in nature and will be necessarily handled dry. It does not dust freely, and all transfer points will have dust extraction and filtration systems. Should spillage onto the loading jetty occur, this will be collected by appropriate mechanical means and returned to the plant site. Potential causes of spillage are misalignment of conveyor belts and speed differences between conveyors. The effect of any misalignment in the jetty conveyor has been controlled by limiting belt cross-section utilisation to 70%. Shiploader transfer chute blockages are unlikely because the volume of the chute allows for differential slowdown time.

Comments from key government agencies

The Department of Environmental Protection (DEP) expressed the following concerns:

- whether or not the environmental flow (due to tide and wind) and the local water depth is sufficient to prevent a local accumulation of effluent and to enable the jet/plume dilutions calculated by Weather News International (WNI) to occur;
- the fact that satisfactory plume dilution is likely to occur as long as the 20m diffuser is oriented transverse to the tide and current flow;
- whether or not the discharge is likely to be mixed through the water column or be transported away from the area as a bottom layer after initial dilutions and plume fall;
- that the proponent should maintain a quality controlled contaminant inputs inventory (flow rate, concentration and load) for all contaminants discharged to marine waters;
- that the spatial scale as well as the temporal frequency of monitoring should also be agreed with the EPA/DEP;
- that an initial baseline survey would be extensive enough to determine evidence of other sources of contamination and to select control sites;

- that the Tri-Butyl-Tin (TBT) regulations under the Environmental Protection Act prohibit coating fixed structures and pylons with TBT based paints in bays and semi-enclosed waters;
- the fact that one ship every three days may give rise to significant TBT contamination, although only monitoring will tell, and that the potential for contamination will be minimised if no ship/boat maintenance is allowed at the jetty;
- the impact of product dust on the marine environment has not been discussed;
- that with respect to safety aspects in the handling and shipping of DRI as detailed in Section 7.3.11.1 of the CER, the provisions and precautions outlined are reasonable, but it is not clear where responsibility lies if there is any environmental impact arising from an accident;
- whether or not shipping operations will be co-ordinated by a port authority. The Department indicated that if this is so, then that authority should also be encouraged to adopt the latest Guidelines of the International Marine Organisation (IMO) and the Australian Quarantine Inspection Service (AQIS), and should maintain a watching brief on all shipping in respect of ballast water issues and practices; and
- the lack of detail presented in Section 4.4.4 of the CER in relation to local currents in Nickol Bay.

The Fisheries Department of Western Australia expressed concern regarding the possible contamination of water and sediments by antifouling and anti-scaling agents, corrosion inhibitors and heavy metals.

The Fisheries Department indicated that it would seem reasonable to expect the proponent to address this issue with a more specific programme of testing and monitoring aimed at keeping levels of these substances within appropriate guidelines (if available) rather than just stating their use would be 'minimised' (page 7-25). This process would be made more straight forward if Environmental Quality Objectives existed for the region."

"In order for the Fisheries Department to assess this project adequately, it would be beneficial if the proponent provided more information on the composition of the anti-scalant and corrosion inhibitor and an indication of the quantities that will reach the marine environment."

The Department of Transport (DOT) provided the following comments:

"The proponent will be responsible for all operational matters in the port area associated with the facility and at all times shall comply with best port practice, particularly in relation to ballast water control, oil/chemical spills, loading of product, general port safety, cyclones and shipping movements."

4.2.3Public Submissions

No public submissions were received.

4.2.4Proponent's response

In response to the issues detailed in the government agency submissions, the proponent provided the following comments:

"The available information indicates that the local water depths and currents are sufficient to prevent local accumulation and for the calculated dilutions to occur. The modelling indicates that the plume would be diluted to less that 1ppt above the background salinity levels by the time that the plume reaches the sea floor if discharged at the surface of a water body with a depth of 6m. Therefore, the modelling results indicate that the plume will not be transported away as a bottom layer."

"The Proponent will periodically monitor the concentrations of heavy metals, free chlorine and other marine water quality parameters in the marine discharge prior to its release. The quantity of water discharged will also be monitored on a regular basis through the circulatory system."

"The proposed monitoring programme will be undertaken to the reasonable satisfaction of the EPA in consultation with DEP and CALM. As such the temporal frequency of the monitoring will be defined in discussions with the EPA, DEP and CALM."

"The Proponent has committed to undertake the monitoring surveys in the vicinity of its operations and does not intend to undertake a larger regional scale monitoring programme. As stated in Commitment 10 the Proponent will assist in the identification of sources of contamination in the event that any contamination is attributed to its Project."

"The proposed load-out facility will be located in open, well flushed waters."

"The Proponent will use cathodic protection for corrosion control and anti-foulant coatings on submerged structures."

"Anodes, usually comprised of metallic zinc, are designed to corrode away in preference to the steel structures they are designed to protect. The rate of release of the oxidised zinc is slow and in waters subject to strong currents and tidal movements the potential for increase in the waters adjacent to the facilities is also low. The impact of such increase is expected to be small due to the low biological activity in the immediate vicinity of the structures."

"Coatings on submerged structures are mostly inert and include concrete and epoxy compounds. Antifouling compounds are generally only used on structures immersed for relatively short periods of time due to the need for re-coating at regular intervals which is generally not possible on permanently submerged structures. The coatings for these structures will be chosen on the basis of several factors including the potential impacts on the environment, longevity and cost. These coatings will not contain TBT and the DEP, CALM and Department of Transport will be consulted during the selection process."

"Periodic monitoring for TBT may be included within the monitoring programme committed to by the Proponent (Commitment 10) depending upon the results of an assessment of its potential for accumulation in the marine environment."

"Commitment 10 states that the Proponent will undertake surveys of toxic contaminants that may occur in the effluent, particularly organic pollutants (eg. heavy metals), in the marine sediment and suitable biota from the area. These surveys would be undertake prior to commissioning and during operations with the frequency of testing to be decided in consultation with the EPA. The specific details of the monitoring programme have yet to be decided however it is likely that the ANZECC water quality guidelines would be applied to this programme. The Proponent also understands that ANZECC will be releasing draft guidelines for sediment contamination which may also be utilised."

"The composition and quantity of the anti-scalant and corrosion inhibitors that will be used during the development and operation of this Project is unknown. However, Section 7.3.6 of the CER discussed the potential for heavy metal and organic contamination and concluded that the potential for contamination was small due to the design and management measures (such as metered dosing of anti-scalants) incorporated into the Project. Commitment 10 includes monitoring of these potential contaminants."

"The Proponent does not envisage that any ship maintenance will be conducted at the jetty."

"The proposed load-out facilities are located outside of the Port Walcott (Cape Lambert) area which is controlled by Robe River Mining Company (Robe River) and is also outside of the area controlled by the Dampier Port Authority. Therefore, it is likely that the Proponent would have its own gazetted port area and manage its own day to day operations with overall coordination undertaken by the Department of Transport."

"Where the responsibility would rest in the event of an accident occurring during the loading of the DRI would depend upon the nature of the incident, where the incident took place and who

was in control (eg. the Proponent or the Ship owners or the Master of the vessel) at the time of the incident."

"The current (water movement) information was generated by WNI using its knowledge and data available in the vicinity of the Project Area. WNI utilised these data within its modelling while Section 4.4.4 summarised the major currents influencing the North Western Australian Coast."

"The Proponent understands that AQIS maintains a watching brief on all shipping in respect to ballast water issues and practices."

"Section 7.3.11.6 of the CER addressed the issues associated with the discharge of ballast water which is controlled by the AQIS and local port authorities. As stated in the CER, the Proponent will stipulate that shipping companies using the load-out facilities comply with the International Guidelines for preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges."

Commitments made by the proponent

With respect to marine pollution and water quality, the proponent has made the following environmental commitments (refer to Appendix 4 for full list of commitments):

9. The Proponent will discharge the desalination plant flushing water using a seawater surface based diffuser. The discharge system will be designed to minimise any potential environmental impacts to the reasonable satisfaction of the EPA in consultation with the DEP and CALM. [Timing - Detailed engineering design phase].

10. Prior to commissioning, the Proponent will undertake a survey of toxic contaminants that may occur in the effluent, particularly organic pollutants (eg. heavy metals), in the marine sediment and suitable biota from the area. Following commissioning, the Proponent will periodically undertake further testing to assess the impact of the Project. The frequency of the testing will be decided in consultation with the EPA and all sampling results will be supplied to the EPA on an annual basis.

In the event that unacceptable levels of contamination are identified and are shown to be attributable to the AUSI Iron Project, the Proponent will:

- assist in the investigations to identify the source;
- undertake remedial action on its plant if it is the source of contamination; and
- remediate the impacted area if its plant is the source of contamination.

This will be completed to the reasonable satisfaction of the EPA in consultation with the DEP and CALM. [Timing - Construction and operation phases].

11. The Proponent will prepare an oil spill contingency plan for the Project prior to the commencement of operations to the reasonable satisfaction of the EPA. [Timing - Prior to construction].

4.2.5Evaluation

Following advice from the Fisheries Department of WA, DEP, CALM and DOT, and the proponent's response to questions raised, the EPA considers that this issue is manageable. The EPA also notes the above commitments made by the proponent and the fact that they address the concerns expressed in the government agency submissions.

The EPA understands that the proponent will prepare an Environmental Management Programme (EMP) for this particular project which will integrated into the EMP required by the EPA in its assessment report for the AUSI Iron Project DR/HBI Plant (Bulletin 794). In effect, the EMP for the AUSI Iron Infrastructure Requirements Project will supplement the EMP required by Bulletin 794.

Accordingly, the EPA recommends that the proponent should prepare a two stage EMP to supplement that which was a requirement of the Environmental Protection Authority's earlier assessment of the AUSI Iron Project, as detailed in Bulletin 794. This EMP, shall include the following amendments and additional information with respect to the intake of ocean cooling water, the discharge of the reverse osmosis desalination plant flushing water, and anti-fouling compounds, to the satisfaction of the EPA on advice from the DEP (Recommendation 2):

Stage 1 - before commissioning, the EMP shall address, but is not limited to the following:

- the nature and location of the intake, and discharge points on the ship loading jetty;
- the sensitivity of the marine ecosystem to changes in temperature and the acceptability of a 1°C above ambient ocean water temperature discharge limit;
- details of anti-fouling compounds that will be used to coat submerged structures; and

Stage 2 - After commissioning, the EMP shall address, but is not limited to the following:

- verification that mixing and the transport of the discharged reverse osmosis plant flushing water at the ocean outfall meets the agreed standard; and
- rectification measures in the event that monitoring indicates that water quality, mixing and transport of the discharged reverse osmosis plant flushing water at the ocean outfall are not to the agreed standard.

The EPA recommends (Recommendation 2) that reports of the results of the monitoring programme should be submitted annually to the DEP for audit, and that they should be made publicly available.

4.3 Marine function and mangrove protection

4.3.1 Objective

The Environmental Protection Authority's objectives are to protect marine flora and fauna from the direct and indirect impacts associated with the development of loading infrastructure of the AUSI Iron project, and protect their function. Specifically these include:

- to limit the direct impacts of dredging activities;
- to protect marine turtles from disturbance of nesting activities ;
- limit seasonal impacts on fauna including coral spawning as a consequence of the timing of construction; and
- limit impact on recreational and commercial fisheries.

Additionally, the Environmental Protection Authority's objective is to protect mangrove systems. That is, to ensure no net loss of mangroves and maintenance of their function through:

- least practicable direct disturbance;
- maintenance of existing tidal patterns;
- maintenance of existing ground water flows;
- prevention of fresh water irrigation of mangroves through controlling drainage;
- maintenance of sedimentation patterns;
- maintenance of existing water quality; and
- dust control.

4.3.2 Evaluation framework

Existing policy framework

The Government Position Paper New Horizons in Marine Management (1994).

Technical information

Loss of marine life as a consequence of the direct impacts of dredging

Channel and turning basin construction will require dredging. This will occur to the north east of Dixon Island, as indicated in Figure 3.

Direct loss of marine life will occur in the proposed dredge area, with some additional although likely limited loss occurring with construction of the jetty through causeway construction and pile driving activities. Macrofaunal populations of the proposed alignment were assessed during the site selection process and found to be poor.

The CER indicated that biological studies conducted in relation to dredging undertaken in Mermaid Sound for the Woodside LNG and LPG Projects have shown that burrowing infauna disturbed during dredging quickly recolonise dredge sites due to the presence of a softer substrate which they favour.

A variety of significant fauna including corals, turtles and dugongs occur in the region. Marine fauna are most susceptible to disturbance during breeding season and while feeding. The dredging operation associated with the Project represents the greatest potential for impact on marine fauna.

The proposed jetty alignment and shipping channel does not affect any of the areas used by dugongs for feeding (seagrass areas) or by turtles for nesting (sandy beaches).

Coral spawning generally occurs in March to April. It is synchronised with the phases of the moon, with one or two spawning periods of three to five days each year. Turtles are known to nest from late spring to early autumn.

Dredging operations may disturb and discourage breeding through noise, change in current flows, increased sedimentation and turbidity. Dredging operations will be conducted preferably during winter to minimise potential effects on turtle breeding or coral spawning.

Subsequent maintenance dredging, predicted to be required at 15 year intervals, would result in similar direct impacts, although on a smaller scale. Dredging operations will be conducted to the satisfaction of the Department of Transport and the EPA.

Impact on local fishing and prawning industry

The following issues of concern to the community were identified:

- disturbance to fish nursery sites; and
- disturbance to trawling routes through the location of the load-out facility.

Modelling results have indicated that the higher salinity desalination plant flushing water discharge will have no detrimental impacts on the marine environment.

Nursery sites occur in mangrove areas and shallow embayments in the region. Although a small number of mangroves (*Avicennia marina*) will be removed through the construction of the causeway adjacent to Madigan Point, this is unlikely to impact significantly upon nursery site availability as the affected mangroves occur on a rocky substrate which has negligible nursery value.

Disturbance to trawling routes will occur in the project area due to the presence of the load-out facility. This will not affect the main trawling area which is located on the western side of Nickol Bay.

Impacts from light spill

Light spill from the project may also affect turtle hatchlings. The CER indicated that the effect of light spill on turtles will be minimised through the design of the lighting system and the use of low pressure sodium lights.

Disturbance to mangrove communities

The scattered clumps of mangroves (*Avicennia marina*) which grow between the boulders along the southern half of the western side of Madigan Point will be removed during construction of the overland conveyor. The conveyor route and causeway length has been selected to reduce loss and adverse impact on mangrove and samphire communities.

The following factors were considered in the selection of the jetty alignment:

- best engineering practice would identify the projection of the causeway directly from the end of Madigan Point ;
- presence of an Aboriginal heritage site centrally on Madigan Point;
- poor benthic fauna on an alignment east of Madigan Point relative to an achievable alignment to the east;
- sparse mangal community on the western edge of Madigan Point relative to the east; and
- the need to align the jetty such that rich coral communities on the western end of Dixon Island are not affected.

The alignment is presented in Figure 3. Detail of the disturbed shore area is presented in Figure 4.

The alignment chosen will involve the removal of approximately 1ha of rocky foreshore habitat of which less than 50% is covered by mangrove. The impact will be localised as the species is widely represented in the region. The more extensive stands of mangroves occurring along the eastern side and northern end of the western side of Madigan Point and containing the same species will not be disturbed.

The northern-most bend in the railway will pass between a rocky hillside and a mangrove margin (refer to Plate 6 in the CER). The mangroves abut directly onto a spinifex ridge instead of the usual saline flats.

Comments from key government agencies

The Department of Conservation and Land Management (CALM) provided the following comments:

"Section 7.3.8 (Protection of Marine Fauna) states that the effect of light spill on turtles will be minimised through the design of the lighting system and the use of low pressure sodium lights. The proponent is encouraged to liaise with CALM prior to developing the lighting plan."

The Fisheries Department of Western Australia provided the following comments:

"The AUSI Iron additional infrastructure project in the Pilbara is proposed for an area where there currently exists a managed prawn trawl fishery (14 licenses), licensed fish trawling and an extensive recreational fishery. Any significant loss or modification of marine biota through removal or contamination may affect these fisheries."

The Department's main areas of concern for these fisheries related to:

- prawn trawler access; and
- turbidity and smothering effects resulting from dredging activity and sea bottom disturbance by ship turning.

The Department also commended the proponent for considering the situation of recreational fishers by stating that they are in favour of fishers using the load-out facility for mooring.

The Department of Minerals and Energy (Mining Operations Division) provided the following comment:

"Measures to prevent/minimise impacts on terrestrial and marine flora and fauna will need to be clearly described in the EMP."

The Australian Nature Conservation Agency (ANCA) recommended that the potential impact on the marine wildlife in the area, including impacts on marine turtles and dugongs should be assessed. ANCA indicated that insufficient attention appears to have been given to potential impacts on the coastal and wetland environments and the species associated with them. ANCA also indicated that it was not satisfied with the level of environmental assessment and recommended that further investigations be carried out to determine the level of potential impacts on these environments and associated species.

4.3.3Public Submissions

One public submission expressed concern about the loss of mangroves on the western side of Madigan Point that would result from the construction of the causeway for the conveyor.

4.3.4Proponent's response

In response to the issues detailed in the public and government agency submissions, the proponent provided the following comments:

"The Proponent will liaise with CALM during the development of its lighting plan for the load-out facility."

"The potential impacts of the Project associated with the local fishing and prawning industry were discussed in Section 7.3.10 of the CER. This concluded that while the Project would disturb some trawling routes within the Project Area, the main trawling routes located on the western side of Nickol Bay will not be disturbed."

"The load-out facility has been designed to minimise its impact on the environment. The proposed alignment of the jetty and shipping channel does not affect any of the areas used by Dugongs for feeding (seagrass areas) or by turtles for nesting (sandy beaches). Further, the open piled structure proposed for the load-out facility will result in only a small disturbance to ocean water movements in the area. Therefore, additional assessments are not warranted."

"Approximately one hectare of land, comprising less than 50% of mangroves, will be cleared during construction of the overland conveyor and this represents only a very small proportion of the mangrove population in the Project Area. The mangroves in this area occur in scattered clumps on boulders along the southern half of the western side of Madigan Point and are in poor condition due to the unfavourable rocky growth stratum. As a consequence, these mangroves provide only limited habitat for marine species and therefore do not represent a significant loss of resource from this area. The impact of clearing this small area will be minimal and localised as this species is widely represented in the region. The extensive stands of mangroves which occur along the eastern side and northern end of the western side of Madigan Point will not be cleared. These and other mangroves in the area are more favourably located, in better condition and provide a more extensive habitat for mangrove fauna which will ensure the maintenance of resources."

Commitments made by the proponent

17. The Proponent would ensure that there is no net loss of mangroves due to the Project. The placement of a small groyne perpendicular to the seaward end of the causeway is expected to result in the formation of a sand beach which would be expected to provide a suitable environment for natural establishment of mangroves in this area. However, in the event that the natural establishment of mangroves has not commenced within three years from the commissioning of the conveyor, the Proponent would plant replacement

mangroves on the fringes of existing mangrove communities in the vicinity of the Project Area. These activities would be undertaken to the reasonable satisfaction of the EPA.

18. The Proponent would liaise with CALM during the development of the lighting plan for the load-out facility. This would be undertaken to the reasonable satisfaction of the EPA in consultation with CALM.

4.3.5Evaluation

Following advice from CALM, the Fisheries Department of WA, DOME and ANCA, and the proponent's response to questions raised, the EPA considers that this issue is manageable. The EPA notes the commitments made by the proponent to prepare an EMP which will be integrated into the one required by Recommendation 2 of Bulletin No. 794, and to liaise with CALM during the development of the lighting plan for the load-out facility.

The EPA recommends that Stage 2 of the proponent's EMP should detail the following information to the satisfaction of the EPA on advice from the DEP (Recommendation 2):

- details of any mangrove loss and measures to compensate for any loss during construction or operation of the additional marine based infrastructure as well as proposed rehabilitation or remediation programme; and
- reports on the results of meetings with the relevant professional fishing representative group.

The EPA also recommends that, in consideration of the importance of mangal communities, the proponent undertake whatever measures are necessary to ensure that there is no net loss of mangroves and that it maintains their function through (Recommendation 4):

- least practicable direct disturbance;
- maintenance of existing tidal patterns;
- maintenance of existing ground water flows;
- prevention of fresh water irrigation of mangroves through controlling drainage;
- maintenance of sedimentation patterns;
- maintenance of existing water quality; and
- dust control.

4.4 Protection of terrestrial flora and fauna

4.4.1 Objective

The Environmental Protection Authority's objective is to protect flora and fauna in the Wickham to Cape Lambert region from harmful impacts associated with the construction and operation of the additional infrastructure required for the recently proposed AUSI Iron Project DRI plant.

4.4.2 Evaluation framework

Completion of infrastructure requirements will require the removal or disturbance of vegetation from corridors traversing a number of land systems. Vegetation may also be disturbed as a result of changes to drainage patterns. The vegetation types present in the project area are well represented in the region.

Existing policy framework

To meet the requirements of the Wildlife Conservation Act (1950) for rare and endangered flora and fauna.

Technical information

Protection of Terrestrial Vegetation

A field survey supplemented the Desk study undertaken to assess the likely presence and status of significant flora in the area. Two communities of interest occur in the railway spur corridor. These are:

- *Triumfetta appendiculata* habitats

  The disturbance required for the construction of the railway may result in the loss of some individuals of *Triumfetta appendiculata* (Priority Three - Poorly Known Taxa) inhabiting a drainage line on Karratha Station (Figure 4.7). However, sustainable populations of this species do occur outside the Project Area and elsewhere in the region. The loss of *T. appendiculata* as a result of construction of this Project will be minimised, wherever possible; and

The proponent has undertaken to reduce the degree of disturbance of terrestrial vegetation by:

- carefully planning the type and extent of disturbance;
- avoiding the disturbance of *Triumfetta appendiculata* habitats, where possible;
- confining temporary work areas to previously disturbed areas, where possible;
- parking vehicles and machinery only in designated locations;
- prohibiting off-road recreational activities of employees;
- retaining root stock and topsoil wherever possible during clearing operations;
- retaining cleared vegetation for respreading during rehabilitation;
- undertaking local seed collection;
- raising the awareness of the workforce about conservation issues through the environmental induction programme; and
- progressively rehabilitating disturbed areas.

The CER stated that the environmental management of terrestrial vegetation will be addressed further in the EMP, in consultation with CALM.

Protection of Fauna

Fauna habitats in the project area are well represented throughout the region and none are considered to be significant. There are no wetlands within the coastal fringe nor on creek and river margins. Represented habitats may support a variety of fauna, but most of these species are likely to be highly mobile and exploit relatively large areas.

Linear disturbances may create barriers to the movement of smaller animals and subdivide territories. The barrier created by the gas pipeline will only occur temporarily during the construction phase. Progressive rehabilitation behind the construction "front" will limit the effective length of the barrier at any one time. The barrier created by the railway line will be more permanent but culverts under the railway line, provided on drainage crossings, will enable small animals to cross under the railway line.

Small reptiles and mammals may fall into open trenches and become trapped. Some burrowing species may occasionally be unearthed during earthworks.

The animals of the area are not expected to be affected by train noise, which will be intermittent and of a short duration.

Interruptions to surface flow as a result of the construction of tracks and roads may cause changes to down slope vegetation and, consequently, changes to the characteristics of the fauna habitat.

Other risks to fauna as a consequence of wildfires, off road vehicle and use may also occur.

The Proponent has undertaken to reduce the impact of the project on native fauna by:

- minimising the extent of disturbance to the vegetation of the project area;
- covering or sealing all open foundation holes and trenches wherever possible to prevent injury to stock or native fauna;
- inspecting open holes and trenches regularly for trapped fauna and releasing trapped individuals;
- prohibiting firearms and domestic pets in the project area;
- rehabilitating disturbed areas progressively to minimise habitat loss;
- raising the awareness of the workforce about the conservation of fauna and their habitats through the environmental induction programme;
- avoiding direct contact with fauna, wherever possible;
- parking vehicles and machinery only in designated locations to minimise habitat damage;
- slowing or stopping vehicles to allow fauna sufficient time to move to safety;
- prohibiting off-road recreational activities.

The CER stated that any specific environmental management procedures to minimise disturbance to or loss of individuals of rare or significant fauna species will be identified in consultation with CALM and will be addressed in the EMP.

Comments from key government agencies

The Australian Nature Conservation Agency (ANCA) expressed concern about the apparently small amount of field survey work undertaken in the region. ANCA recommended that thorough field surveys for flora and fauna be undertaken, including surveys of threatened species listed in Schedule 1 of the Endangered Species Protection Act 1992 (ESP Act). ANCA suggested that further field survey work be carried out to determine the significance of the sandy plains and samphire flat habitat and possible impacts on migratory birds.

ANCA was also concerned about the CER concluding that because vertebrate species identified in the region have wide distributions throughout the Pilbara, they were not considered to be of particular significance. ANCA also pointed out that the proponent will need to comply to ensure that Australia meets its obligations under the Japan-Australia and China-Australia Migratory Birds Agreements (JAMBA and CAMBA), the Convention on the Conservation of Migratory Species (Bonn Convention) and the Convention on Wetlands of International Importance (Ramsar Convention).

The Department of Minerals and Energy (Mining Operations Division) provided the following comment:

"Measures to prevent/minimise impacts on terrestrial and marine flora and fauna will need to be clearly described in the EMP."

4.4.3Public Submissions

No public submissions were received.

4.4.4Proponent's response

In response to the issues detailed in the government agency submissions, the proponent provided the following comments:

"The key environmental features of the Project Area were described through a comprehensive combination of desktop and field investigations. The objective of these investigations was to collect sufficient data to determine whether the biophysical characteristics of the Project Area are typical of those found in the region."

"The desktop investigations comprised:

- the collation and review of relevant environmental reports and other scientific literature, environmental data, maps and aerial photography;
- a search of CALM's Declared Rare and Priority Flora database and the Western Australian Museum's vertebrate fauna databases; and
- consultation with local organisations including officers from the DEP, CALM and Department of Fisheries."

"The information collated during the desktop investigations was used to plan the field investigations by providing an overview of the environmental characteristics of the region and identifying those areas or habitat types which may be of ecological significance and would require specific examination during the field investigations. However, the bulk of the information on all biophysical features (except fauna) was collected as a result of a comprehensive field programme."

"A number of field surveys of the Project Area have been conducted by the Proponent as summarised below:

- evaluation of the three initial alternative sites for the Project on 27 May 1995 by a 2 person team;
- Central Plant Site conducted between 27 and 31 May 1995 by a two person team;
- current plant site, tailings dam, and previous service corridors between 26 July and 2 August 1995 by a two person team;
- proposed railway spur, gas pipeline and overland conveyor corridors between 29 January and 1 February 1996 by a two person team; and
- marine survey of the area in the vicinity of the proposed jetty, load-out facility and dredge areas completed on 3 and 4 January 1996 by a three person team."

"The objectives of the surveys were to:

- describe the landform, soils, vegetation and flora of the Project Area;
- search for rare or other significant flora species;
- identify any areas affected by weeds; and
- identify any environmentally significant or sensitive habitats."

"These surveys used the land systems classification of Payne and Tille (1992) as the framework for describing the main habitat types, but the vegetation of most of the Project Area was described in significantly more detail. This was achieved by undertaking vehicle and foot traverses of the Project Area and recording a range of physical and biological characteristics. These data were in turn used to identify the vertebrate fauna habitats present in the Project Area and to describe the fauna species known or likely to occur in the Project Area."

"The results of these surveys were compared with the findings of other biological surveys undertaken in the Roebourne Plains area and coastal Pilbara region, including:

- the Department of Agriculture's 1:250,000 Roebourne Plains land systems survey (Payne and Tille, 1992);
- environmental assessments of four large sites in the Cape Lambert area which were assessed as part of the site selection for the proposed plant site (Dames & Moore, 1995);

- a detailed assessment of the Pilbara Energy Project's gas pipeline corridor from Karratha to Port Hedland, which included the proposed alignment of the AUSI Iron Project's natural gas pipeline (Dames & Moore, 1994);
- a flora and fauna survey of the Karratha Pipeline Extension for the Pilbara Energy Project (Dames & Moore, 1995);
- a preliminary investigation of the proposed Cape Lambert/Dixon Island Heavy Industry Site (Halpern Glick Maunsell, 1994)
- a vertebrate fauna survey of the Leslie Salt evaporation ponds (Ninox Wildlife Consulting, 1991);
- biological surveys undertaken for BHP's HBI Project (BHP, 1994);
- Port Hedland Heavy Industrial Site Study (BHP Engineering, 1994);
- the flora and fauna studies undertaken for the proposed Maitland Industrial Estate near Dampier (BHP Engineering, 1994);
- a study of the Onslow region (Storr and Harold, 1985);
- surveys undertaken for the North West Shelf Development Project (Woodside Petroleum Development Pty Ltd, 1979); and
- work undertaken in Mermaid Sound and the Dampier Archipelago by Forde (1985), Semenuik and Wurm (1987), Semenuik et al. (1982)."

"Desktop studies which use vegetation mapping and descriptions to describe the fauna habitats of a Project Area and to predict which species may use these resources is common to many formal assessments, particularly at the lower level of a CER. One of the main difficulties associated with undertaking a fauna field survey as part of the preparation of a CER is that the results of the survey would represent a "snapshot in time" of the status of the fauna assemblages resident in the Project Area at the time of the survey. It is unlikely that migratory, nomadic, cryptic or rare fauna would be adequately sampled. Therefore, a systematic series of field surveys is required over a number of years and sampling all seasons. In the absence of these data, it is possible to describe the fauna habitats of the Project Area using the vegetation descriptions collated as a result of the field surveys and to predict the likely fauna assemblages using data from other surveys in the region. The validity of this approach depends on the reliability of the data and sampling methodology, and whether any taxonomic changes or changes to a species' conservation status have occurred since these surveys."

"However, these difficulties do not negate the need for site-specific field surveys to confirm the results of the desktop studies and to facilitate the development of specific management strategies and procedures for significant species. Therefore, the Proponent will undertake a fauna survey of the Project Area, in accordance with Recommendation 3 of the AUSI Iron Project DR/HBI Assessment Report (EPA Bulletin 794). The scope of this survey would be determined in consultation with the EPA, DEP and CALM and would be undertaken prior to construction."

"As discussed in Question 1.1, the Proponent has already undertaken a number of terrestrial flora surveys of the Project Area. Further, a marine survey was also conducted of the areas likely to be affected by the jetty, load out facility and the surrounding environs."

"Recommendation 3 of the AUSI Iron Project DR/HBI Plant Assessment Report (EPA, Bulletin 794) recommended that the Proponent undertake a fauna study of the Project Area. The Proponent plans to undertake this study prior to construction and the programme will be defined in consultation with the EPA, DEP and CALM."

"As stated in the above responses, the Proponent will undertake a fauna study of the Project Area. The scope of this study would be defined in consultation with the EPA, DEP and CALM and would be undertaken prior to construction."

"The statement quoted from the CER was intended as a summary which stated that the flora and fauna of the Project area were widely distributed and common throughout the Pilbara. In

reaching this conclusion, the conservation status of species found (in the case of flora) and thought to be in the area (in the case of fauna) were taken into consideration as indicated within the CER. For example, if Mulgara had occurred in or adjacent to the Project Area, the assessment procedures used by the Proponent within this Project would have determined that it was of significance and required special consideration."

"The Proponent identified the potential deleterious impacts of the Project on the natural environment in consultation with DMA's such as CALM. The Environmental Management Plan for the Project will address the ongoing environmental management of the Project and will be developed in consultation with CALM. The EMP will also address any special considerations relating to the management of fauna identified by the fauna field study."

"The Project has been designed to minimise the environmental impacts of the Project including the areas of the environment covered by Australia's international conventions and treaties. The desktop fauna assessment undertaken for the Project concluded that the Project was unlikely to have a significant impact on any of the species protected under JAMBA and CAMBA. Therefore, the Proponent does not intend to undertake any further studies on the significance of the sandy plains and the samphire flat habitats to these birds. Due to the expected small areas likely to be impacted by the Project, the Proponent does not believe that any special measures, such as timing of construction phases, are necessary."

Commitments made by the proponent

With respect to flora and fauna, the proponent has made the following environmental commitments (refer to Appendix 4 for full list of commitments):

1. Prior to construction of the Project, the proponent will prepare an Environmental Management Programme, in consultation with the DEP and CALM, to the reasonable satisfaction of the EPA. The EMP will be incorporated into the AUSI Iron Project EMP to ensure reliable and consistent application and review. [Timing - Developed in the pre-construction phase].

   The Proponent will also incorporate the components of this Infrastructure Project into the AUSI Iron EMP recommended by the EPA as part of it's assessment report for that Project. [Timing - Implemented during the construction phase].

2. The Proponent will progressively rehabilitate disturbed areas to minimise disturbance of biological communities. The rehabilitation will be completed to the reasonable satisfaction of the EPA. [Timing - On-going]

19. The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA.

4.4.5Evaluation

Following advice from ANCA and DOME, in consideration of the absence of any wetland habitats and the proponent's response to questions raised, the EPA considers that this issue is manageable. The EPA notes the commitments made by the proponent to prepare an EMP which will be integrated into the one required by Recommendation 2 of Bulletin No. 794, and to progressively rehabilitate disturbed areas to minimise disturbance of biological communities and to select the final easements for the rail spur and gas pipeline based on environmental/surface hydrology constraints.

The EPA also recommends that, prior to construction, the proponent should undertake a fauna field survey of the areas that will be affected by the additional infrastructure, with the view of appropriate rehabilitation as required, in order to quantify the results of the desktop study provided in the CER (Recommendation 5).

4.5 Impacts on existing surface hydrology

4.5.1 Objective

The Environmental Protection Authority's objective is to protect surface water resources in order to prevent impacts to both the terrestrial and marine environments, including nearby mangroves, resulting from activities associated with the construction of additional infrastructure for the proposed AUSI Iron Project DRI plant.

4.5.2 Evaluation framework

Existing policy framework

Meet the requirements of the Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA Bulletin 711, October 1993). All flood drainage structures will be designed with capacity for the 50 year ARI events.

Technical information

The effects of the infrastructure development on the existing surface hydrology of the region are likely to include:

- changes in channel flow dynamics and sediment transport as a result of crossing the Nickol River;
- modification to existing channel hydraulic characteristics imposed by culverts; and
- diversion of flow as a result of the construction of the railway spur.

Nickol River Crossing

The proposed railway spur will traverse the Nickol River, some tributaries and the adjoining flood plain. The flood plain is approximately 750m wide, but the extent of the flow across the flood plain depends on the profile of this area and the size of the flood. However, preliminary calculations indicate that a storm with a 50 year Average Recurrence Interval (ARI) will cause inundation of the flood plain which may extend some hundreds of metres from the river. The presence of the railway may obstruct some of this flow.

Consequently some accretion is expected upstream of the railway on the flood plain and some erosion may occur downstream of the bridge.

The railway bridge across the Nickol River may constrict flow during flood events and result in higher velocities at some points, particularly at the bridge abutments.

The use of a bridge to cross the Nickol River will reduce interference to the flow more than culverts and is therefore the preferred option. The bridge embankment will be protected from erosion by rip rap and gabions where necessary. Potential scour points will be assessed at the detailed engineering design stage.

Culverts

Culverts will be proposed at the sites shown in Figure 4.4 of the CER, at some of the other minor drainage points and will be designed with capacity for the 50 year ARI events.

Localised erosion is anticipated in severe rainfall events. Any area affected by such an event will be rehabilitated following reconstruction of the embankment.

Erosion

Any removal of vegetation cover and disturbance of the ground surface during construction works has the potential to cause erosion by water and wind and therefore sedimentation of surface watercourses and inshore coastal waters.

A trench 1.2m deep and 0.8m wide will be excavated for the laying of the gas pipeline. This trenching will cause the majority of the soil disturbance for the gas pipeline. The sandy soils of the River, Mallina, Cheerawarra and Littoral land systems which occur along several sections of the gas pipeline corridor, are highly susceptible to erosion when vegetation is removed. Other land systems traversed are generally not prone to erosion.

Soils of the railway corridor generally tend not to be prone to erosion. However, sections of the Horseflat land system are prone to erosion especially around gullies on sloping margins to major watercourses. The sandy soils in the area where the railway crosses the Nickol River, are highly prone to erosion once the vegetative cover is removed.

The proponent will minimise the risk of erosion by:

- identifying areas which may be prone to erosion and avoiding disturbance of these areas, wherever possible;
- minimising the extent and duration of ground disturbance and restricting clearing of vegetation as much as possible;
- scheduling creek-crossing construction activities to coincide with low creek flow periods, where practicable;
- adopting temporary stabilisation measures where necessary, particularly adjacent to waterways where direct silt export may occur;
- implementing the dust control measures described in Section 7.2.8 of the CER to minimise wind erosion of exposed areas; and
- progressively rehabilitating disturbed areas using the soil conservation and rehabilitation techniques described in Section 7.2.11 of the CER.

The proponent will conduct site-specific studies to assess the erodibility of soils within the project area. Soil classifications from the land systems data will be used together with the proponent's geotechnical information to determine the areas where a higher degree of erosion control will be required. These issues will be addressed further in the EMP in consultation with the Department of Agriculture, CALM and other relevant DMA's.

Spoil Disposal

Dredge spoil generated by the channel dredging will be used onshore as fill for the construction of the overland conveyor causeway. The use of dredge spoil for this purpose has the potential to cause:

- salt transport and contamination of soil and ground water; and
- environmental impacts associated with erosion of the spoil during construction.

Salt transport and contamination of soil and ground water through the use of dredge spoil is expected to be limited as construction of the overland conveyor platform will be confined to soils which are salt affected and ground water which is hyper saline.

Some potential exists during construction for erosion of the dredge spoil onto the surrounding mangal/salt flat communities. The effect of this will be small as the dredge spoil will contain only a small proportion of silt.

The proponent has undertaken to select the conveyor route so to reduce adverse impacts on mangrove and samphire communities.

Erosion of spoil deposition areas will be minimised through the controlled release of impounded dredge spoil waters via a series of settlement ponds and drainage channels. The design of the settling ponds will be developed once the full geotechnical studies of the dredge channel have been completed.

Comments from key government agencies

The Department of Minerals and Energy's (DOME's) Mining Operations Division questioned the acceptability of the proponent designing the culverts, crossings and bridges along the railway spur to only accommodate a 1 in 50 year storm/flood event, when the area is prone to cyclones. DOME questioned whether or not culverts, crossings and bridges should be designed to cope with a 1 in 100 year storm/flood event.

4.5.3Public Submissions

No public submissions were received.

4.5.4Proponent's response

In response to the concerns expressed in the above government agency submission, the proponent provided the following comments:

"The 1 in 50 return frequency has been selected in accordance with the Hamersley Iron design criteria used for its railways. This represents Hamersley Iron's operational criteria which is considered by Hamersley Iron through working experience to provide an adequate level of protection. The Proponent believes that this design criteria represents an acceptable level of risk for the protection of the proposed railway structure."

Commitments made by the proponent

With respect to impacts on existing surface hydrology, the proponent has made the following environmental commitments (refer to Appendix 4 for full list of commitments):

3. The Proponent will use the dredge spoil as fill in the construction of the overland conveyor. The onshore settling ponds for the dredge spoil will be designed to minimise the return of salt and silt to the ocean. These procedures will be undertaken to the reasonable satisfaction of the EPA in consultation with the DEP. [Timing - Construction phase].

16. Any potential impacts associated with the water used for the hydrostatic testing of the gas pipeline would be limited by retaining or re-using the water wherever possible and using chemicals that break down to benign compounds upon exposure to air in accordance with current industry practice. This would be undertaken during construction and to the reasonable satisfaction of the EPA.

19. The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA.

20. The rail spur would be constructed using conventional engineering design practices. These practices, including compaction of fill and the use of drainage culverts, would minimise wind and water erosion of the rail embankments. This would be undertaken to the reasonable satisfaction of the EPA.

21. Operationally, the Proponent would ensure the safety of the rail spur which includes the minimisation of scouring and undermining of the embankments. The maintenance of the rail spur line would identify and rectify any areas that have been affected by wind and water erosion. This would be undertaken to the reasonable satisfaction of the EPA.

4.5.5Evaluation

Following advice from DOME, and in consideration of accepted local practice and the proponent's response to questions raised, the EPA considers that this issue is manageable. The

EPA notes the above commitments made by the proponent in relation to the construction and maintenance of infrastructure.

Pollution issues

4.6 Dust and particulate emissions

4.6.1 Objective

The Environmental Protection Authority's objective is to protect the health welfare and amenity of residents and maintain the ecological function of terrestrial and nearshore marine environment from unreasonable dust impacts.

This objective would be achieved if the company complied with the EPA's criteria for dust and particulates.

4.6.2 Evaluation framework

Existing policy framework

Western Australian ambient standards for dust and particulates are based on environmental acceptability criteria established by other authorities such as the National Health and Medical Research Council (NH&MRC), Victorian EPA (VEPA), United States Environmental Protection Agency (USEPA) and World Health Organisation (WHO). These standards have been adopted for the protection of human health and amenity. No standards have been adopted for infrastructure elements as proposed in remote locations.

The adoption by the proponent of standards developed for the protection of amenity would result in a significant reduction in broader environmental impacts such as reduced plant vigour as a result of dust deposition on leaf surfaces. In this circumstance, the adoption by the proponent of the Area A standards reflected in the 1992 Environmental Protection Policy (EPP) for Kwinana as detailed in Table 3 below, should be considered a goal rather than an absolute requirement.

TABLE 3

KWINANA EPP AMBIENT STANDARDS AND LIMITS FOR PARTICULATES

	Standard ($\mu g/m^3$)	Limit ($\mu g/m^3$)	
	24-Hour Average	15-Minute Average	24-Hour Average
Area A	150	1,000	260
Area B	90	1,000	260
Area C	90	1,000	150

The three air quality policy areas are defined as follows:

- Area A - used mostly for industrial purposes;
- Area B - a buffer zone between industry and residential use; and
- Area C - the area beyond the buffer zone.

Technical information

Localised dust will be generated during the construction phase from earthworks, movement of vehicles and exposed ground surfaces.

Due to the remote location of the corridors, residents within regional population centres are unlikely to suffer any dust nuisance due to the construction or on-going operational activities.

The impact of dust on vegetation will be reduced as the construction activities will be short term in any given area and accumulated dust will be washed from vegetation during subsequent rains. Minimal dust will be generated during the operation of the railway line.

During operations, particulate emissions may occur from the overland conveyor, particularly at the transfer points and the ship loader. The dust emissions from these points will be controlled through the use of extractive air filters.

Experience in handling DRI indicates that the product does not dust readily. The absolute requirement to handle the material in dry form through silo storage, transfer it by enclosed conveyor and to utilise low impact handling in order to reduce hazards, reduces the potential for significant dust generation and movement. Product dust should not adhere to the conveyor belt due to its low moisture content which results from the fact that water cannot be applied to it.

Dust suppression for sources other than DRI handling will be instituted, using water trucks, sprinklers and other means as necessary, in the event that:

- high levels of dust are observed;
- strong winds and dry conditions make dust generation likely; and
- complaints about dust are received.

Comments from key government agency

The Department of Environmental Protection indicated that the impact of product dust on the marine environment has not been discussed.

The Department of Minerals and Energy's (DOME's) Mining Operations Division provided the following comment with respect to the issue of dust and particulate emissions:

"Changes to the EMP should also address the potential for dusting of the DRI and how this problem would be addressed."

4.6.3Public Submissions

No public submissions were received.

4.6.4Proponent's response

In response to the issues detailed in the government agency submissions, the proponent provided the following comments:

"The CER (Section 7.2.8) stated that dust generation from the overland conveyor transfer points would be controlled through the use of extractive air filtering systems. The dust generated during ship loading activities will be further minimised through the use of the "soft loading" procedures for DRI (the product is lowered into the ship hold and placed in position rather than being dropped from a height)."

Commitments made by the proponent

With respect to dust and particulate emissions, the proponent has made the following environmental commitments (refer to Appendix 4 for full list of commitments):

4. The Proponent will implement dust mitigation measures including containment and suppression during construction of the Project, to the reasonable satisfaction of the EPA in consultation with the DEP and the Department of Minerals and Energy. [Timing - Construction phase].

5. The Proponent will minimise dust generation during the operation of the conveyor by covering the conveyor and using air extraction filtering systems at the transfer points to the reasonable satisfaction of the EPA in consultation with the DEP and the Department of Minerals and Energy. [Timing - Operation phase].

4.6.5Evaluation

Following advice from the Department of Environmental Protection, and the proponent's response to questions raised, the EPA considers that this issue is manageable given the remote location of the additional infrastructure. The EPA notes the commitments made by the proponent to implement dust mitigation measures and to undertake programmes to monitor ambient dust levels and to record dust deposition in the vicinity of the plant on a quarterly basis, or whenever complaints relating to the project occur, and urges the adoption of Area A guidelines from the Kwinana EPP Ambient Standards as a goal.

The EPA understands that the proponent's EMP for this particular project will be integrated into the EMP required by the EPA in its assessment of the AUSI Iron Project DR/HBI Plant in Bulletin 794. However, the proponent is urged to construct and operate the additional infrastructure to a standard consistent with best engineering practice and environmental management in order to limit dust emissions.

The EPA recommends that the proponent's EMP for this particular project should include a monitoring and audit programme for all dust and particulate emissions (including emissions from the ship loading facility, the entire length of conveyor and fugitive dust). Furthermore, reports of the results of these monitoring programmes should be submitted at appropriate intervals to the Department of Environmental Protection for audit, and that they should be made publicly available (Recommendation 2).

4.7 Noise

4.7.1 Objective

The Environmental Protection Authority's objective is to ensure that the health and amenity of surrounding residents is not impacted upon by noise emissions emanating from the additional infrastructure required for the proposed AUSI Iron Project DRI plant. To meet this objective, the EPA's criteria on noise as outlined below would have to be complied with.

4.7.2 Evaluation framework

Existing policy framework

The additional infrastructure required for the proposed AUSI Iron Project DRI Plant would need to comply with the following criteria:

- the Noise Abatement (Neighbourhood Annoyance) Regulations (1979); and
- the proposed Environmental Protection (Noise) Regulations (when promulgated).

Technical information

Existing noise environment

A noise monitoring programme was conducted in the Wickham-Roebourne region over two nights to obtain an indication of the existing noise levels in the residential areas in the region of the project area.

Noise monitoring programme in the residential areas of Wickham, Roebourne and the aboriginal community at Cheeditha were undertaken. L_{90} noise values of between 31dB(A) and

38dB(A) were obtained. Principal sources of noise were domestic air conditioners, traffic noise, rail noise and dogs.

Construction noise

Localised noise will be generated during construction of the additional infrastructure by earthmoving machinery, rollers, trucks and other mechanical equipment. Pile driving activities associated with jetty construction will also generate noise.

The CER indicated that noise and vibration impacts will be managed by the following means:

- noise generation from stationary and mobile equipment will not exceed 85dB(A) at 1m. Equipment used by contractors and subcontractors will be required to comply with this standard;
- if any complaints regarding noise are received, monitoring of noise levels and working activities will be undertaken; and
- the construction activities will comply with the requirements of the Noise Abatement (Neighbourhood Annoyance) Regulations 1979.

Operational noise sources

The major noise sources associated with the use of the proposed infrastructure include:

- train movements;
- operation of the overland conveyor; and
- shipping operations.

The DRI plant will receive one train load of iron ore per day which will not contribute significantly to existing noise levels from train movements.

The DRI product will be transported from the plant site to the load-out facility via the overland conveyor. The overland conveyor will be a conventional type with a drive motor at each end and will be curved with no transfer points along its length. The sound pressure levels from the conveyor drive motors will not exceed 85dB(A) at 1m.

At its closest point, the overland conveyor will be more than 5km from Wickham, the closest residential area. Noise modelling of the conveyor shows that the noise levels associated with the operation indicates that noise levels associated with the conveyor will likely fall below 35dB(A) within 2,000m of the conveyor dependent upon the length of the conveyor affecting the receiving point.

DRI product would be exported by ship with an average of one ship movement every three days. The loading activities will be undertaken over a period of up to 12 hours (for a 30,000t shipment) and the major sources of noise during this operation are expected to be associated with:

- closing of hatches; and
- DRI entering the ship's hold.

The noise levels associated with the closing of hatches will be controlled through operational practices. Loading noise will be minimised through the use of a "soft loader" which consists of a vertical conveyor inside of a tube. The soft loader conveyor has shelves which cause it to act like a bucket elevator in reverse.

The pump used to supply seawater for the DRI plant's desalination plant will be located in a pump house and is therefore not expected to result in any unacceptable noise impacts.

210 piles are to be fixed, during the jetty construction, with actual driving requiring one hour to effect. Impacts noises, when predicted at Wickham under calm conditions are unlikely to be detected above ambient levels.

Comments from key government agency

The Department of Environmental Protection (DEP) carried out a technical evaluation of the information presented in the CER relating to noise emissions, and presented the following comments.

Section 7.2.9.1. Criteria

The report states that the draft Environmental Protection (Noise) Regulations "have been adopted for this study", and given that these regulations may well be in force by the time the project is operational, their use is appropriate. It is noted that Commitment 6, however, refers to compliance with the current Noise Abatement (Neighbourhood Annoyance) Regulations 1979. This needs to be clarified.

Section 7.2.9.3. Construction noise

The report states that "noise generation from stationary and mobile machinery will not exceed 85dB(A) at 1 metre". This is clearly unrealistic, much common construction equipment emitting noise levels of the order of 85 to 90dB(A) at 7 metres, while extremely noisy operations such as piling by hammer methods may be much higher in level. Given the distances from the project site to the nearest residences (2-3km from the end of the railway to the Wickham township and 6-8km from the jetty to the town), the more realistic noise emission values indicated above may still not represent a significant noise impact in terms of daytime construction activities but could be significant at night.

It is recommended that, in relation to construction noise, the proponent provide the following information to the DEP supplementary to the CER:

- predicted source sound power levels for typical construction machinery likely to be used;
- hours of operation of the construction works;
- predicted noise levels at the nearest noise-sensitive premises; and
- details of any noise emission specifications or restrictions on operating hours.

The report also states that construction noise will comply with the current regulations, in contradiction to the statement in Section 7.2.9.1. This anomaly needs to be clarified.

Sections 7.2.9.4 - 7.2.9.8. Operational noise sources

These sections deal with operational noise from train movements, the overland conveyor, shipping operations and the sea water cooling water supply pump. In each case, the conclusion that the noise impact will be insignificant is accepted.

Section 7.2.9.9. Summary

The conclusion in relation to construction noise may be accepted subject to further advice as requested above. The commitment to comply with the requirements of the current regulations should be revised to refer to the proposed Environmental Protection (Noise) Regulations.

Recommendations

1. It is recommended that, in relation to construction noise, the proponent provide the following information to the DEP supplementary to the CER:
    - predicted source sound power levels for typical construction machinery likely to be used;
    - hours of operation of the construction works;
    - predicted noise levels at the nearest noise-sensitive premises; and
    - details of any noise emission specifications or restrictions on operating hours.

2. It is recommended that Commitment 6, which refers to compliance with the requirements of the current regulations, should be revised to refer to the proposed Environmental Protection (Noise) Regulations.

The Department of Minerals and Energy (Mining Operations Division) provided the following comments:

"The proposed noise emission levels (outlined in Section 7.2.9.3) of 85dB(A) at a distance of 1m should satisfy this Department's noise limits, provided that a tonal component of any noise generated by the plant is eliminated if practicable."

4.7.3Public Submissions

No public submissions were received.

4.7.4Proponent's response

In response to the issues detailed in the government agency submissions, the proponent provided the following comments:

"Appendix D of Australian Standard 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites provides sound power levels associated with various pieces of site equipment. Table 4 summarises the sound power levels of selected construction equipment from AS 2436-1981."

TABLE 4

TYPICAL A-WEIGHTED SOUND POWER LEVELS FROM SITE EQUIPMENT
(AUSTRALIAN STANDARD 2436-1981 APPENDIX D)

Plant	Measured Range of A-weighted Sound Power Level (dB)
Cranes, crawler (100kW)	102 to 115
Excavator (100-200kW)	108 to 112
Generators (110kV.A)	< 108

"The sound power levels associated with the piling activities will depend upon the type of pile driver used. Kaiser Engineers has advised the Proponent that the sound pressure levels (at 1m) expected from the pile driver will be between 90 and 100dB(A) which equates to a sound power level of between 98 and 108dB(A)."

"Wickham represents the closest noise sensitive receptors and is approximately 3km from the railway spur at the closest point. The jetty/load-out facility is approximately 6km from Wickham at its closest point. Table 5 presents the sound pressure levels calculated for distances of between 3 and 6km for a source with a sound power level of 115dB(A)."

TABLE 5

CALCULATED SOUND POWER LEVELS AS A FUNCTION OF DISTANCE RESULTING FROM SOURCE WITH A SOUND POWER LEVEL OF 115dB(A)

Distance (m)	Calculated Sound Pressure Level dB(A)
3,000	37
4,000	35
5,000	33
6,000	31

"The calculations presented in Table 5 are conservative as no account has been taken of barrier effects from the intervening terrain and vegetation. The detailed noise modelling undertaken within the original CER for the AUSI Iron Project (Dames & Moore, 1995) showed the significance of the hills between the site and Wickham in reducing the noise impacts associated with the Project."

"The results presented in Table 5 show that construction noise associated with the railway may approach the DEP night-time criteria under this worst case prediction scenario only at its eastern extremity. However, at this stage it is envisaged that the railway construction activities will occur between 6am and 6pm on a six day working week or a 13 day working fortnight."

"The construction of the jetty and load-out facility is expected to be conducted 24 hours a day, seven days a week until completed. However, it is expected that the actual pile driving will take place for a very small percentage of the time as the physical hammering to drive pile pairs for each cantilever section is anticipated to take less than one hour. Therefore, on the basis of the modelling results presented in Table 5, the distance between Wickham and the piling operations, the anticipated sound power levels from the pile driver and the low percentage of time associated with the piling operations, it can be concluded that the noise impacts of the these operations will be acceptable."

"In the event of unacceptable noise levels occurring in Wickham as a result of the construction activities associated with the Project, the Proponent will investigate the source of the noise and undertake remedial action. Appendix E of AS 2436-1981 summarises some of the remedial options available to the Proponent in this event."

Commitments made by the proponent

With respect to noise emissions, the proponent made the following environmental commitment (refer to Appendix 4 for full list of commitments):

6. The Proponent will ensure that noise from the Project will comply with the requirements of the current *Noise Abatement (Neighbourhood Annoyance) Regulations 1979.* The Proponent will also comply with the *Environmental Protection (Noise) Regulations* when these regulations are promulgated. If noise levels attributable to the Project exceed EPA criteria, the Proponent will take measures to minimise the impacts.

4.7.5Evaluation

Following advice from the Department of Environmental Protection, and the proponent's response to questions raised, the EPA considers that this issue is manageable given the remote location of the proposed plant. The EPA notes the commitment made by the proponent to ensure that noise associated with the construction and operation of the Project will comply with the requirements of the Noise Abatement (Neighbourhood Annoyance) Regulations 1979 and the Environmental Protection (Noise) Regulations when they are promulgated.

4.8 Other Issues

Industrial waste disposal

The Pilbara Region is the focus for considerable industrial development. Development is centred on downstream processing of resource materials, stimulated in part to the deregulation of the energy sector. This rapid development is likely to continue into the immediate future.

This development continues in the absence of an approved industrial waste disposal site in the Region.

The lack of such facilities may have the effect of limiting future industrial development reliant of secure waste disposal facilities.

The EPA advises Government to address the lack of secure industrial waste disposal facilities in the Pilbara Region through the identification and development of one or a strategic number of appropriate facilities.

Duplication of infrastructure

The development of common user infrastructure in the Pilbara Region has the potential to reduce environmental impacts as a consequence of their development and ongoing operation.

The EPA advises Government to undertake strategic planning and co-ordination in order to reduce unnecessary duplication of infrastructure, particularly port, rail and gas facilities, in the Pilbara Region.

Management of ballast waters and ships' residues

The recent focus on the establishment of exotic marine species possibly introduced through the discharge of ballast water and associated ships' residues, has resulted in the identification of a problem which is likely to result in enormous damage to marine ecosystems, and as a consequence, negative impacts on fishing and tourism industries.

Measures developed by AQIS and adopted by IMO for the management of the introduction of exotic marine species through ballast water and residues is on a voluntary basis only, with a level of compliance in the order of 80% (AQIS 1992 in Ottaway 1994).

If uncontrolled, exotic species can cause massive destruction of indigenous ecological communities and ecosystems. The cost for management or control of these impacts can be considerable, if at all possible.

Ottaway (1994) notes that it is clear that once exotic species become established in coastal marine communities they are extremely difficult and expensive to control. Consequently, measures to limit their entry through the prevention of intake of organisms, removal of organisms prior to discharge at port or non discharge of ballast in susceptible waters are desirable. Alternatively, discharge could be made to on-shore treatment tanks.

The EPA raises the broader issue of the potential impacts of the discharge of ballast waters and ships' residues to Government, and advises of the need to develop a total barrier for the introduction of such organisms, possibly with the development and introduction of mandatory measures.

Social surroundings issues

4.9 Risks and hazards

4.9.1 Objective

The Environmental Protection Authority's objective is to ensure that surrounding residents are not subjected to unacceptable levels of risk from the construction and operation of the additional infrastructure required for the proposed AUSI Iron Project DRI Plant.

4.9.2 Evaluation framework

Existing policy framework

The proponent will need to comply with:

- The Environmental Protection Authority's - Criteria for the assessment of risk from industry (EPA Bulletin 611, 1992);
- the Department of Minerals and Energy's criteria and requirements on risks and hazards management; and
- the International Marine Organisation Regulations (1991) which deal specifically with the handling of DRI.

Technical information

Qualitative Risk Assessment

A preliminary review of the potential risks associated with the construction and operation of the proposed infrastructure indicated that the major off-site risks will be associated with the construction and operation of the natural gas pipeline.

The major hazard associated with the natural gas pipeline is the release of natural gas due to a leak or rupture of the pipeline. As the operating pressure of the pipeline will be above atmospheric pressure, any break in the pipeline will cause gas to escape with high velocity, displacing soil and potentially affecting the surrounding area. The resulting gas cloud may find an ignition source and catch fire, causing further damage to people and property in the area.

Explosions involving natural gas in unconfined areas are very rare. Although the possibility of explosion at a compressor or valve station exists, the possibility is almost insignificant along the main length of the pipeline provided gas build up to flammable levels in confined spaces can be eliminated. The principal reasons for the reduced likelihood of vapour cloud explosions (VCE's) are:

- natural gas is lighter than air and therefore does not form ground hugging clouds; and
- natural gas will not 'explode', producing significant over-pressures, in unconfined environments.

For these reasons, VCE's are not considered significant.

Asphyxiation is not considered a likely consequence because there would need to be a confined area to enclose the gas and provide sufficient quantities to envelope a person. Toxic poisoning is not considered to be represent a high risk.

The main cumulative effect of locating the gas pipeline adjacent to the existing gas pipelines is the potential for escalation of an incident due to possible damage to the neighbouring pipeline from the ruptured pipeline. Damage of a pipeline following the failure of the adjacent pipeline would be due to either:

- movement; or

- exposure to thermal radiation levels.

It is assumed that the existing pipelines and the proposed gas pipeline would be at least 30m apart. Mitigation measures will be developed at the points of closest approach and these measures may include:

- a full survey of all pipeline routes within the corridor;
- following a release from one pipeline, flow should continue in the adjacent pipeline, to remove heat from the pipeline wall;
- development of a joint Emergency Response Plan for all pipelines; and
- a separation distance between the pipelines sufficient to remove the possibility of escalation (considered to be 30m).

The CER stated that the final operating pressure of the proposed pipeline is the subject of current engineering design studies is undecided, but is likely to be between 6,000 and 10,200kPa. The risks associated with the operation of the pipeline will be minimised via the use of isolation valves. The preliminary indications are that two isolation valves would be sufficient to reduce the distance to the acceptable 1 x 10^{-6} per year fatality risk criteria (EPA, 1992) to less than 150m.

The CER stated that the proponent will further analyse and minimise the risks associated with the proposed gas pipeline during its final engineering design.

Safety Aspects in the Handling and Shipping of DRI

The following two characteristics of DRI affect handling and shipping:

- it oxidises on contact with seawater and produces heat, hydrogen and iron oxide; and
- it has a very porous structure which limits the transfer of heat.

If DRI oxidises within a stockpile or ship hold the heat produced will collect and increase, thereby presenting an explosive hazard associated with the ship's operation. To minimise the risks associated with the handling of DRI, the International Marine Organisation Regulations (1991) will be adhered to by all parties concerned with the shipment of DRI. The procedures are reproduced in the CER.

The CER stated that adherence to these procedures means that DRI can be handled and shipped with very few problems.

Comments from key government agency

The Department of Minerals and Energy (Mining Operations Division) provided the following comments with respect to risks and hazards:

"The CER for the infrastructure requirements foreshadows the handling and shipping of DRI (page 7-28). This means that the scope for the original plant (contained in the CER dated September 1995) does now not include a briquetting plant. By not briquetting the DRI, new hazards and risks are introduced, which are:

- reactivity of the DRI with water, water vapour, rain water (not just sea water as implied in Section 7.3.11.1) means there is a serious risk of hydrogen generation;
- hydrogen very readily forms explosive mixtures and any minor leak can readily ignite, leading to a fire risk and the risk of explosion;
- fire and explosive risks of the DRI within the ships containers, on conveyor belts and on the load-out facility; and
- the potential for asphyxiating atmospheres in storage areas."

"Hydrogen gas will need to be monitored."

"A set of commitments as for Plant Operation (Section 25), and the Natural Gas Pipeline (Section 26) (for the AUSI CER dated September 1995), are to be included for the DRI

Conveying System. These should include the definition of Hazardous Zones around the conveying system, and safety and emergency management plans with respect to dust emission, fire and explosion hazards."

"Similarly, a set of commitments for Ship loading and Embarkation are required. These should include procedures to prevent the risk of fire or explosion, in particular due to contact of moisture in any form eg. rain or sea water with the DRI, maintenance of inert atmospheres in ship holds, and safety and emergency management plans with respect to dust emission, fire, explosion, or damage to a ship at the jetty or in the proximity of the coastline where environmental damage may result."

"Contingency plans for fire explosion risks dealing with vessels at the jetty need to be submitted for review. These plans need to consider aspects such as how the company will deal with a hydrogen fire or explosion, or the situation where a ship hold fills with hydrogen."

"Changes to the CER should also address the potential for dusting of the DRI and how this problem would be addressed."

4.9.3Public Submissions

No public submissions were received.

4.9.4Proponent's response

In response to the issues detailed in the public and government agency submissions, the proponent provided the following comments:

"The Proponent will conduct a HAZOP prior to the final design and commissioning of the plant. The HAZOP will include the handling, storage and shipping of DRI. Hazardous zone classifications will also be defined for areas of the plant, including the overland conveyor."

"Section 7.3.11.1 of the CER summarised the International Marine Organisation Regulations that would be applied to minimise the risks associated with the handling of DRI. Adherence to these procedures means that the handling and transport of DRI can be undertaken safely."

"The Proponent has added the following two new commitments."

"COMMITMENT 14 - The Proponent will undertake a HAZOP study and have hazardous zone classifications for areas of the Project. This work will be completed during the detailed engineering design phase and to the reasonable satisfaction of the EPA."

"COMMITMENT 15 - The Proponent will adopt the International Marine Organisation Regulations (1981) for the handling and shipping of DRI which includes monitoring of hydrogen gas concentrations within the cargo spaces. This will be undertaken to the reasonable satisfaction of the EPA and the DME."

"Contingency plans for dealing with fires associated with the Project (including hydrogen fires during ship loading) will be developed by the Proponent during the detailed engineering design and form part of the overall emergency response plan for the facility. This plan would be submitted to the DME and local Emergency Response Groups for review prior to implementation."

Commitments made by the proponent

With respect to the management of risks and hazards, the proponent has made the following environmental commitment (refer to Appendix 4 for full list of commitments):

7. The following commitments are made relating to the construction and operation of the gas pipeline:
    - construction in accordance with AS 2885-1987;

- a separation distance between the lateral natural gas pipeline and residential properties of approximately 150m. These distances are based on a preliminary estimation of risks and are considered to be conservative;
- marking of the pipeline route;
- regular patrols of the pipeline (including walking, road and aerial patrols);
- development of a joint Emergency Response Plan for all pipelines in the proposed corridor;
- communication with adjacent landowners;
- use of appropriate corrosion protection and detection (internal and external); and
- use of appropriate depth of cover.

This will be completed to the reasonable satisfaction of the EPA and the Department of Minerals and Energy.

14. The Proponent will undertake a HAZOP study and have hazardous zone classifications for areas of the Project. This work will be completed during the detailed engineering design phase and to the reasonable satisfaction of the EPA.

15. The Proponent will adopt the International Marine Organisation Regulations (1981) for the handling and shipping of DRI which includes monitoring of hydrogen gas concentrations within the cargo spaces. This will be undertaken to the reasonable satisfaction of the EPA and the DME.

4.9.5Evaluation

Following advice from the Department of Minerals and Energy (Mining Operations Division), and the proponent's response to questions raised, the EPA considers that this issue is manageable given the remote location of the proposed new infrastructure. The EPA notes the commitments made by the proponent to ensure that risks associated with the construction and operation of the new infrastructure will comply with the requirements of the Department of Minerals and Energy's criteria and requirements on risks and hazards management, and the International Marine Organisation Regulations (1991), which deal specifically with the handling of DRI.

5. Conclusions & Recommendations

5.1 Conclusions

Table 2 summarised the process used by the EPA to evaluate the topics raised during the environmental impact assessment process. The table identifies the topics and the proposal characteristics in relation to the topic. The comments received from Government agencies and the public are then evaluated in the process of the identification of issues. Table 6 (below) summarised the remaining issues which warranted further evaluation by the EPA.

Following review of the proponent's Consultative Environmental Review, the issues raised in public submissions, advice received from government departments, relevant literature and the proponent's revised environmental management commitments, the EPA concludes that on the information currently available, that the proposal by Australian United Steel Industry Pty Ltd for the development of additional infrastructure in support of the AUSI Iron project at Wickham can be managed to meet the EPA's objectives.

In reaching this conclusion, the EPA identified the main environmental factors requiring consideration to be:

- marine and near shore impacts associated with the intake of ocean water for a reverse osmosis desalination plant and the discharge of this plant's flushing water back into the ocean. Also includes impacts from clearing, construction, dredging, filling, and operation of the ship loading facility, jetty, berths and other infrastructure, especially impacts on mangroves, corals, sea turtles, dugongs and other marine life;
- protection of flora and fauna;
- potential impacts on existing surface hydrology (stream location, flood plain alteration etc) due to the construction and operation of the additional infrastructure;
- dust and particulate emissions;
- liquid and solid waste disposal;
- noise; and
- risks and hazards.

Table 6. Summary of recommendations

Issues	Objective	Evaluation Framework	Proponent's Commitments	EPA Recommends
Biophysical Impacts				
Turbidity sedimentation and associated impacts: • turbidity, sedimentation and associated impacts resulting from product transport.	To protect the marine environment from potential impacts associated with the construction and operation of the additional infrastructure required for the proposed DRI plant.	Characteristics of the discharged flushing water identified, as well as potential impacts on the marine environment from dredging, shipping and construction and operational activities. Monitoring requirements also identified.	• Dredging operations will be conducted preferably during winter, with autumn and spring the next preferred seasons, to minimise sedimentation.	Proponent's new EMP to be integrated into the EMP required by EPA Bulletin 794 and to include the following: Stage 1 - Before commissioning • maintenance dredging requirements for shipping channel, including volume and frequency of dredging and methods of dredge spoil disposal.
• marine pollution resulting from the use of antifouling paints, corrosion inhibitors and descaling chemicals; and desalination plant discharges.			• The Proponent will discharge the desalination plant flushing water using a seawater surface based diffuser. The discharge system will be designed to minimise any potential environmental impacts. • The Proponent will undertake a survey of toxic contaminants that may occur in the effluent, particularly organic pollutants (eg. heavy metals), in the marine sediment and suitable biota from the area. The Proponent will periodically undertake further testing to assess the impact of the Project. In the event that unacceptable levels of contamination are identified and are shown to be attributable to the AUSI Iron Project, the Proponent will: - assist in the investigations to identify the source; - undertake remedial action on its plant if it is the source of contamination; and - remediate the impacted area if its plant is the source of contamination. • The Proponent will prepare an oil spill contingency plan for the Project.	Proponent's new EMP to be integrated into the EMP required by EPA Bulletin 794 and to include the following: Stage 1 - Before commissioning • the nature and location of the intake, and discharge points on the ship loading jetty; • the sensitivity of the marine ecosystem to changes in temperature and the acceptability of a 1°C above ambient ocean water temperature discharge limit; • details of anti-fouling compounds that will be used on structures; and Stage 2 - After commissioning • verification that mixing and the transport of the discharged flushing water at the ocean outfall meets the agreed standard; and • rectification measures if monitoring shows that water quality, mixing and transport of the discharged flushing water at the ocean outfall are not to the agreed standard. Reports from monitoring programmes to be submitted to the DEP and are to be made publicly available.
Marine water quality: • loss of benthic by direct impacts of dredging.	To protect flora and fauna (including mangroves and migratory birds) in the Wickham to Cape Lambert region from harmful impacts associated with the development and operation of the additional infrastructure required for the proposed DRI plant. To ensure that the conservation status of flora and fauna in the region is properly recognised.	Evaluation of the adequacy of the flora and fauna field surveys undertaken by the proponent and potential impacts on flora and fauna.	• The proponent will prepare an Environmental Management Programme, in consultation with the DEP and CALM, to the reasonable satisfaction of the EPA. To be incorporated into the AUSI Iron Project EMP to ensure reliable and consistent application and review. The Proponent will also incorporate the components of this Infrastructure Project into the AUSI Iron EMP. This expanded EMP will constitute part of the proponent's assessment report for that Project.	
• impact on local commercial and recreational fisheries.				Stage 2 of the proponent's EMP should detail the following information to the satisfaction of the EPA on advice from the DEP: • reports on the results of meetings with the relevant professional fishing representative group.
• seasonal impacts on turtle nesting.				All dredging be undertaken in accordance with best industry practice in order to reduce impacts on the environment. All dredging should be undertaken during winter or otherwise to the satisfaction of the EPA on advice from CALM.
• impacts on light spill on turtle populations.			• The Proponent would liaise with CALM during the development of the lighting plan for the load-out facility. This would be undertaken to the reasonable satisfaction of the EPA in consultation with CALM.	
• impacts on terrestrial flora and fauna, including mangroves.	To protect flora and fauna (including mangroves and migratory birds) in the Wickham to Cape Lambert region from harmful impacts associated with the development and operation of the additional infrastructure required for the proposed DRI plant. To ensure that the conservation status of flora and fauna in the region is properly recognised. The protect ion of mangrove systems. That is, to ensure no net loss of mangroves and maintenance of their function through: • least practicable direct disturbance; • maintenance of existing tidal patterns; • maintenance of existing ground water flows; • prevention of fresh water irrigation of mangroves through controlling drainage; • maintenance of sedimentation patterns; • maintenance of existing water quality; and • dust control.	Policy on mangroves includes: • no reduction or least practicable reduction in mangrove population; • continued mangrove health; and • retention of existing mangrove function.	• The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA. • The Proponent will progressively rehabilitate disturbed areas to minimise disturbance to biological communities. • The Proponent would ensure that there is no net loss of mangroves due to the Project. The placement of a small groyne perpendicular to the seaward end of the causeway is expected to result in the formation of a sand beach which would be expected to provide a suitable environment for natural establishment of mangroves in this area. However, in the event that the natural establishment of mangroves has not commenced within three years from the commissioning of the conveyor, the Proponent would plant replacement mangroves on the fringes of existing mangrove communities in the vicinity of the Project Area. These activities would be undertaken to the reasonable satisfaction of the EPA. • The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA.	Proponent to ensure that there is no net loss of mangroves and that it maintains their function through: • least practicable direct disturbance; • maintenance of existing tidal patterns; • maintenance of existing ground water flows; • preventing fresh water irrigation of mangroves by controlling drainage; • maintenance of sedimentation patterns; • maintenance of existing water quality; and • dust control. Stage 2 of the proponent's EMP should detail the following information to the satisfaction of the EPA on advice from the DEP: • details of any mangrove loss during construction or operation of the additional marine based infrastructure and proposed rehabilitation or remediation programme; and The EPA recommends that the proponent's new EMP, which will be integrated into the EMP required by EPA Bulletin 794, include the following amendment relating to flora and fauna: The EPA recommends that, prior to construction, the proponent should undertake a fauna field survey of the areas that will be affected by the additional infrastructure, with the view of appropriate rehabilitation as required, in order to quantify the results of the desktop study detailed in the CER.

Table 6. Summary of EPA recommendations (cont'd)

Issues	Objective	Evaluation Framework	Proponent's Commitments	EPA Recommends
Pollution impacts				
Surface hydrology: • protection of the existing surface hydrology (stream location, flood plain size etc) from construction and operational impacts.	To protect surface water resources in order to prevent impacts to both the terrestrial and marine environment's from the construction and operation of the additional infrastructure.	Characteristics of existing surface hydrology identified. All flood drainage structures designed to 50 year return events.	• The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA. • The rail spur would be constructed using conventional engineering design practices. These practices, including compaction of fill and the use of drainage culverts, would minimise wind and water erosion of the rail embankments. This would be undertaken to the reasonable satisfaction of the EPA. • Operationally, the Proponent would ensure the safety of the rail spur which includes the minimisation of scouring and undermining of the embankments. The maintenance of the rail spur line would identify and rectify any areas that have been affected by wind and water erosion. This would be undertaken to the reasonable satisfaction of the EPA. • Any potential impacts associated with the water used for the hydrostatic testing of the gas pipeline would be limited by retaining or re-using the water wherever possible and using chemicals that break down to benign compounds upon exposure to air in accordance with current industry practice. This would be undertaken during construction and to the reasonable satisfaction of the EPA.	No further recommendation made by the EPA.
• impacts of dredge on-shore spoil disposal.		Meets requirements of Western Australian Water Quality Guidelines	• The Proponent will use the dredge spoil as fill in the construction of the overland conveyor. The onshore settling ponds for the dredge spoil will be designed to minimise the return of silt to the ocean.	No further recommendation made by the EPA.
Dust and particulate emissions.	To protect surrounding residents so that dust and particulate emissions from the construction and operation of the additional infrastructure required for the proposed AUSI Iron Project DRI plant will not impact upon their amenity or cause health problems. To protect vegetation from dust related impacts.	Environmental Protection Policy (EPP) standards or Kwinana which was promulgated by the State Government on 17 July 1992, be adopted as a goal for dust impact management.	• The Proponent will implement dust mitigation measures including containment and suppression during construction of the Project • The Proponent will minimise dust generation during the operation of the conveyor by covering the conveyor and using air extraction filtering systems at the transfer points.	The EPA recommends that the proponent's new EMP, which will be integrated into the EMP required by EPA Bulletin 794, include the following amendment relating to dust and particulate emissions: • a monitoring and audit programme for all dust and particulate emissions (including emissions from the ship loading facility, the entire length of conveyor and fugitive dust).
Noise.	To ensure that the health and amenity of surrounding residents is not impacted upon by noise emissions emanating from the additional infrastructure required for the proposed AUSI Iron Project DRI plant.	Daily noise levels at nearest residential properties to comply with the requirements of the Noise Abatement (Neighbourhood Annoyance) Regulations 1979 and the proposed Environmental Protection (Noise) Regulations.	• The Proponent will ensure that noise from the Project will comply with the requirements of the current *Noise Abatement (Neighbourhood Annoyance) Regulations 1979*. The Proponent will also comply with the *Environmental Protection (Noise) Regulations* when these regulations are promulgated. If noise levels attributable to the Project exceed EPA criteria, the Proponent will take measures to minimise the impacts.	No further recommendation made by the EPA.
Social surroundings				
Risks and hazards, particularly from the handling of DRI and the construction and operation of the gas pipeline.	The Environmental Protection Authority's objective is to ensure that surrounding residents are not subjected to unacceptable levels of risk from the construction and operation of the additional infrastructure required for the proposed AUSI Iron Project DRI Plant.	The proponent will need to comply with: • The Environmental Protection Authority's - Criteria for the assessment of risk from industry (EPA Bulletin 611, 1992); • the Department of Minerals and Energy's criteria and requirements on risks and hazards management; and • the International Marine Organisation Regulations (1981) which deal specifically with the handling of DRI.	• The following commitments are made relating to the construction and operation of the gas pipeline: - construction in accordance with AS 2885-1987; - a separation distance between the lateral natural gas pipeline and residential properties of approximately 150m. These distances are based on a preliminary estimation of risks and are considered to be conservative; - marking of the pipeline route; - regular patrols of the pipeline (including walking, road and aerial patrols); - development of a joint Emergency Response Plan for all pipelines in the proposed corridor; - communication with adjacent landowners; - use of appropriate corrosion protection and detection (internal and external); and - use of appropriate depth of cover. - The Proponent will undertake a HAZOP study and have hazardous zone classifications for areas of the Project. - The Proponent will adopt the International Marine Organisation Regulations (1981) for the handling and shipping of DRI which includes monitoring of hydrogen gas concentrations within the cargo spaces.	No further recommendation made by the EPA.

5.2 Specific recommendations

Noting the conclusion reached, the EPA submits the following recommendations to the Minister for the Environment.

Recommendation 1

That the Minister for the Environment note that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, subject to the proponent's revised environmental management conditions and the EPA's recommended conditions and procedures (see Recommendation 6)

Recommendation 2

The Environmental Protection Authority recommends that the proponent prepare a two stage Environmental Management Programme (EMP) to supplement that which was a requirement of the Environmental Protection Authority's earlier assessment of the AUSI Iron Project, as detailed in Bulletin 794. This EMP, shall include the following amendments and additional information, to the satisfaction of the Environmental Protection Authority on advice from the DEP:

Stage 1 - Before commissioning, the EMP shall address, but is not limited to the following:

1. Ocean cooling water intake and discharge of reverse osmosis desalination plant flushing water, and details of anti-fouling compounds

- the nature and location of the intake, and discharge points on the ship loading jetty;
- the sensitivity of the marine ecosystem to changes in temperature and the acceptability of a 1°C above ambient ocean water temperature discharge limit;
- details of anti-fouling compounds that will be used to coat submerged structures;

2. Maintenance dredging requirements

- maintenance dredging requirements for the shipping channel, including volume and frequency of dredging and methods of dredge spoil disposal; and

3. Dust and particulate emissions

- a monitoring and audit programme for all dust and particulate emissions (including emissions from the ship loading facility, the entire length of conveyor and fugitive dust).

Stage 2 - After commissioning, the EMP shall address, but is not limited to the following:

1. Ocean cooling water intake and discharge of reverse osmosis desalination plant flushing water

- verification that mixing and the transport of the discharged reverse osmosis plant flushing water at the ocean outfall meets the agreed standard;
- rectification measures in the event that monitoring indicates that water quality, mixing and transport of the discharged reverse osmosis plant flushing water at the ocean outfall are not to the agreed standard;

2. Mangroves

details of any mangrove loss and measures to compensate for any loss during construction or operation of the additional marine based infrastructure as well as proposed rehabilitation or remediation programme; and

3. Meetings with relevant professional fishing representative group

reports on the results of meetings with the relevant professional fishing representative group.

Reports of the results of all monitoring programmes are to be submitted annually to the DEP for audit, and are to be made publicly available.

Recommendation 3

The EPA recommends that all dredging be undertaken in accordance with best industry practice in order to reduce impacts on the environment. Furthermore, all dredging should be undertaken during winter or otherwise to the satisfaction of the EPA on advice from CALM.

Recommendation 4

The EPA recommends that, in consideration of the importance of mangal communities, the proponent undertake whatever measures are necessary to ensure that there is no net loss of mangroves and that it maintains their function through:

- least practicable direct disturbance;
- maintenance of existing tidal patterns;
- maintenance of existing ground water flows;
- prevention of fresh water irrigation of mangroves through controlling drainage;
- maintenance of sedimentation patterns;
- maintenance of existing water quality; and
- dust control.

Recommendation 5

The EPA recommends that, prior to construction, the proponent should undertake a fauna field survey of the areas that will be affected by the additional infrastructure, with the view of appropriate rehabilitation as required, in order to quantify the results of the desktop study provided in the CER.

Recommendation 6

The EPA recommends that if a decision is made that the proposal be implemented, the conditions set out in Section 6 of this assessment report be applied.

6. Recommended environmental conditions

Based on the assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate.

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 Consultative Environmental Review and subsequently, those made in response to issues

raised following public submissions; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

The environmental management commitments (May 1996), were published in EPA Bulletin 81X (Appendix 4) and a copy is attached.

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 Programme (EMP)

An Environmental Management Programme applicable in two stages, prior to and post commissioning is required.

4-1 Prior to commissioning, the proponent shall prepare Stage 1 of the EMP to the requirements of the EPA on advice of the DEP. This programme shall address, but not be limited to the following:

Ocean cooling water intake and discharge of reverse osmosis plant flushing water, and details of anti-fouling compounds

1. the nature and location of the intake and discharge points on the ship loading jetty;
2. the sensitivity of the marine ecosystem to changes in temperature and the acceptability of a $1^{o}C$ above ambient ocean water temperature discharge limit;
3. details of anti-fouling compounds that will be used to coat submerged structures;

Maintenance dredging requirements

4. maintenance dredging requirements for the shipping channel, including volume and frequency of dredging and methods of dredge spoil disposal; and

Dust and particulate emissions

5. a monitoring and audit programme for all dust and particulate emissions (including emissions from the ship loading facility, the entire length of conveyor and fugitive dust).

4-2 Within three months following commissioning, the proponent shall prepare Stage 2 of the EMP, to the requirements of the EPA on advice of the DEP. This programme shall address, but not be limited to the following:

Ocean cooling water intake and discharge of reverse osmosis plant flushing water

1. verification that mixing and the transport of the discharged reverse osmosis plant flushing water at the ocean outfall meets the agreed standard;

2. rectification measures in the event that monitoring indicates that water quality, mixing and transport of the discharged reverse osmosis plant flushing water at the ocean outfall are not to the agreed standard;

Mangroves

3. details of any mangrove loss and measures to compensate for any loss during construction or operation of the additional marine based infrastructure as well as proposed rehabilitation or remediation programme; and

Meetings with relevant professional fishing representative group

4. reports on the results of meetings with the relevant professional fishing representative group.

4-3 The EMP shall propose clear environmental objectives, based upon but not limited to the subject of conditions 4-1 and 4-2 above.

4-4 The proponent shall integrate this EMP into the EMP required by Condition 4 of the Statement for the "Direct Reduction/Hot Briquetted Iron Plant, Cape Lambert" Assessment 956, published on 26 March 1996.

4-5 The proponent shall implement the two stages of the EMP required by Conditions 4-1 and 4-2 at appropriate times.

5 Dredging operations

5-1 The proponent shall undertake all dredging operations in accordance with best industry practice in order to reduce impacts on the environment.

5-2 The proponent shall undertake all dredging operations during winter or otherwise to the satisfaction of the EPA on advice of the Department of Conservation and Land Management.

6 Mangroves

6-1 The proponent shall undertake whatever measures are necessary to ensure that there is no net loss of mangroves and shall maintain their function through:

1 least practicable direct disturbance;

2 maintenance of existing tidal patterns;

3 maintenance of existing ground water flows;

4 prevention of fresh water irrigation of mangroves through controlling drainage;

5 maintenance of sedimentation patterns;

6 maintenance of existing water quality; and

7 dust control.

7 Fauna

7-1 The proponent shall ensure the protection of rare fauna within the infrastructure development areas.

7-2 To achieve the objective of Condition 7-1, prior to construction the proponent shall conduct a fauna field survey of the areas that will be affected by the additional infrastructure, with the view of appropriate rehabilitation as required, to the satisfaction of the Environmental Protection Authority on advice of the Department of Conservation and Land Management.

8 Decommissioning

8-1 The proponent shall carry out the satisfactory decommissioning of the project, removal of installations and rehabilitation of the site and its environs.

8-2 To achieve the objectives of condition 8-1, at least six months prior to decommissioning, the proponent shall prepare a decommissioning and rehabilitation plan.

8-3 The proponent shall implement the plan required by condition 8-2.

9 Time Limit on Approval

The environmental approval for the proposal is limited.

9-1 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 Department of Environmental Protection that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years.

10 Performance Review

10-1 Each five years following the formal authority issued to decision-making authorities under Section 45(7) of the Environmental Protection Act 1986, the proponent shall submit a review of environmental protection, including but not limited to, the environmental objectives and the audit of performance against the objectives.

The objectives shall be derived from those identified in the fulfilment of the requirements of the Environmental Management Programme condition (condition 4 above).

This review shall be to the Environmental Protection Authority's requirements, on advice of the Department of Environmental Protection. The environmental objectives may be changed by the Environmental Protection Authority following the review.

11 Compliance Auditing

To help determine environmental performance, periodic reports on progress in implementation of the proposal are required.

11-1 The proponent shall submit periodic Progress and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

1 Data arising from any future meteorological data collection in the Karratha to Cape Lambert area should be used by appropriate Government agencies in assessing the air quality performance of the proponent.

2 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.

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

Note

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

7. References

Anthropos Australis Pty. Ltd. and Robinson, M. (1995) The Report of an Aboriginal Heritage Survey (Survey 2) for the Australian United Steel Industry Cape Lambert DR/HBI Project, Western Australia. Prepared for the Nanga-Ngoona Moora-Joorga Land Council.

Australian Bureau of Statistics (1991) 1991 Census.

Australian Quarantine Inspection Service and the Ballast Water Steering Committee (1992) Ballast Water: Ships are Bringing Harmful Organisms into Australian Waters - What Can Be Done?. Bureau of Rural Resources.

Barnett, J.C. and Leach, R.E.J. (1978) Wickham Townsite Expansion Study. Unpublished Geological Survey of Western Australia Report.

Blakers, M. Davies, S.J.J.F. and Reilly, P.N. (1984) The Atlas of Australian Birds. Melbourne University Press.

Bradshaw, A.D. and Chadwick, M.J. (1980) The Restoration of Land. Studies in Ecology, Volume 6. University of California Press, Berkley.

Bureau of Rural Resources (1992) Ballast Water Occasional Paper No. 6. Bureau of Rural Resources.

Coastal Engineering Research Centre (1977) Shore Protection Manual. Third Edition, U.S. Army Coastal Engineering Research Centre.

Dames & Moore (1982) Argyle Diamond Project. Environmental Review and Management Programme. For Argyle Diamond Mines Pty Ltd.

Dames & Moore (1995) AUSI Iron Project: Proposed DR/HBI Plant Cape Lambert, Western Australia. Prepared for Australian United Steel Industry.

Dell, J. (1995) Vertebrate Fauna Assessment of the Proposed DR/HBI Project Area near Cape Lambert. Unpublished report prepared for Dames & Moore.

Dell, J. (1996) Vertebrate Fauna Assessment of the Railway Spur Corridor, Gas Pipeline Corridor and Corridor for the Terrestrial Components of the Load-Out Facility of the Proposed DRI Plant, Cape Lambert. Unpublished Report Prepared for Dames & Moore.

Department of Conservation and Land Management (1994) A Representative Marine Reserve System for Western Australia: Report of the Marine Parks and Reserves Selection Working Group. Department of Conservation and Land Management, Perth, WA.

Department of Defence (1995) Australian National Tide Tables 1996. Commonwealth of Australia.

Department of Fisheries (1996) Nickol Bay Prawn Fishery Annual Management Report 1995. Department of Fisheries, Perth, WA.

Environmental Protection Authority (1992) Criteria for the Assessment of Risk from Industry. Bulletin 611.

Environmental Protection Authority (1993a) A Guide to Environmental Impact Assessment in Western Australia. Environmental Protection Authority, Perth, WA.

Environmental Protection Authority (1993b) Red Book Status Report. Conservation Reserves for Western Australia. Environmental Protection Authority, Perth, WA.

Environmental Protection Authority (1995) AUSI Iron Project, DR/HBI Plant, Cape Lambert, Western Australia: Report and Recommendations of the Environmental Protection Authority. Bulletin 794.

Forde M.J. (1985) Technical Report on Suspended Matter in Mermaid Sound, Dampier Archipelago. Department of Conservation & Land Management, Perth, Western Australia.

Geological Survey of Western Australia (1964) Dampier and Barrow Island, Western Australia. Sheets SF/50-1 and 50-2.

Geological Survey of Western Australia (1979) Roebourne. Sheet SF/50-3.

Halpern Glick Maunsell (1993) Liquefied Petroleum Gas (LPG) Extraction Project Consultative Environmental Review. Prepared for Woodside Offshore Petroleum Pty Ltd.

Halpern Glick Maunsell (1994) Cape Lambert/Dixon Island Heavy Industrial Siting Study. Preliminary investigation prepared for the Department of Resources Development and LandCorp.

Hollands, D. (1984) Eagles, Hawks and Falcons of Australia. Thomas Nelson of Australia, Melbourne.

Howe, R.A., Dell, J. and Cooper, N.K. (1991) Vertebrate Fauna. In: Ecological Survey of Abydos-Woodstock Reserve, Western Australia. Records of the Western Australian Museum. Supp. 37.

International Marine Organisation (1991) International Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens From Ships Ballast Water and Sediment Discharges. International Marine Organisation.

Johnstone, R.E. (1990) Mangrove and Mangrove Birds of Western Australia. Records of the Western Australian Museum, Supplement No. 32.

Lefroy, E.C., Hobbs, R.J. and Atkins, L.J. (1991) Revegetation Guide to the Central Wheatbelt. Department of Agriculture, Perth, WA.

LeProvost Dames & Moore (1995). 1994 LPG Jetty and Ship-Turning Basin Dredging Programme Marine Monitoring Programme.

Longbon, A. (1994) Town Planning Scheme No. 7: Roebourne, Wickham, Point Samson Scheme Report. Shire of Roebourne.

Ninox Wildlife Consulting (1991) Extensions to Leslie Salt Evaporation Ponds; Vertebrate Fauna Assessment and Potential Fauna Relocation Program. Internal Report to Leslie Salt Pty. Ltd.

Payne, A.L. and Tille, P.J. (1992) An Inventory and Condition Survey of the Roebourne Plains and Surrounds, Western Australia. Technical Bulletin No. 83. Ed. By D.A.W. Johnson and L.J. Snell. Department of Agriculture, Perth, WA.

Pilbara 21 Steering Committee (1992) Pilbara 21 Final Strategy Report. WA Government Publishing Service, Perth, WA.

Pilgrim, D.H. (1987) Runoff Routing Methods. In: Australian Rainfall and Runoff - A Guide to Flood Estimation Volume 1. Institution of Engineers, Australia.

Semenuik, V. (1982) Geomorphology and the Holocene History of the Tidal Fats, King Sound, North-Western Australia. *J.Roy. Soc. WA* **65** (2): 47-68.

Semenuik, V. (1993) The Mangrove Systems of Western Australia: 1993 Presidential Address. *J. Roy. Soc. WA* **76**: 99-122.

Semenuik, V. and Wurm, P.A.S. (1987) Mangroves of the Dampier Archipelago. *J. Roy. Soc. of WA* **69** (2): 29-87.

Semenuik, V., Chalmer, P.N. and LeProvost, I. (1982) The Marine Environments of the Dampier Archipelago. *J. Roy. Soc. WA* **65**: 97-114.

Shire of Roebourne (1995) Social Indicators Atlas. Draft Report.

Strahan, R. (ed.) (1983) The Australian Museum Complete Book of Australian Mammals. Angus & Robertson, Sydney.

Storr, G.M. (1984) Birds of the Pilbara Region. Records of the Western Australian Museum. Supp. 16.

Storr, G.M. and Harold, G. (1985) Herpetofauna of the Onslow Region, Western Australia. *Records of the Western Australian Museum* **12(3)**: 277-292.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1981) Lizards of Western Australia Vol. I. Skinks. UWA Press with Western Australian Museum, Perth, WA.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983) Lizards of Western Australia Vol. II Dragons and Monitors. Western Australian Museum, Perth, WA.

Storr, G.M. Smith, L.A. and Johnstone, R.E. (1986) Snakes of Western Australia. Western Australian Museum, Perth, WA.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990) Lizards of Western Australia Vol. III. Geckos and Pygopods. Western Australian Museum, Perth, WA.

Tyler, M.J., Smith, L.A. and Johnstone, R.E. (1984) Frogs of Western Australia. Western Australian Museum, Perth, WA.

West Pilbara Health Services (1995) Roebourne, Wickham and Point Samsom Health Service Review. February, 1995.

Wilson, S.K. and Knowles, D.G. (1988) Australia's Reptiles. A Photographic Reference to the Terrestrial Reptiles of Australia. Collins Publishers, Australia.

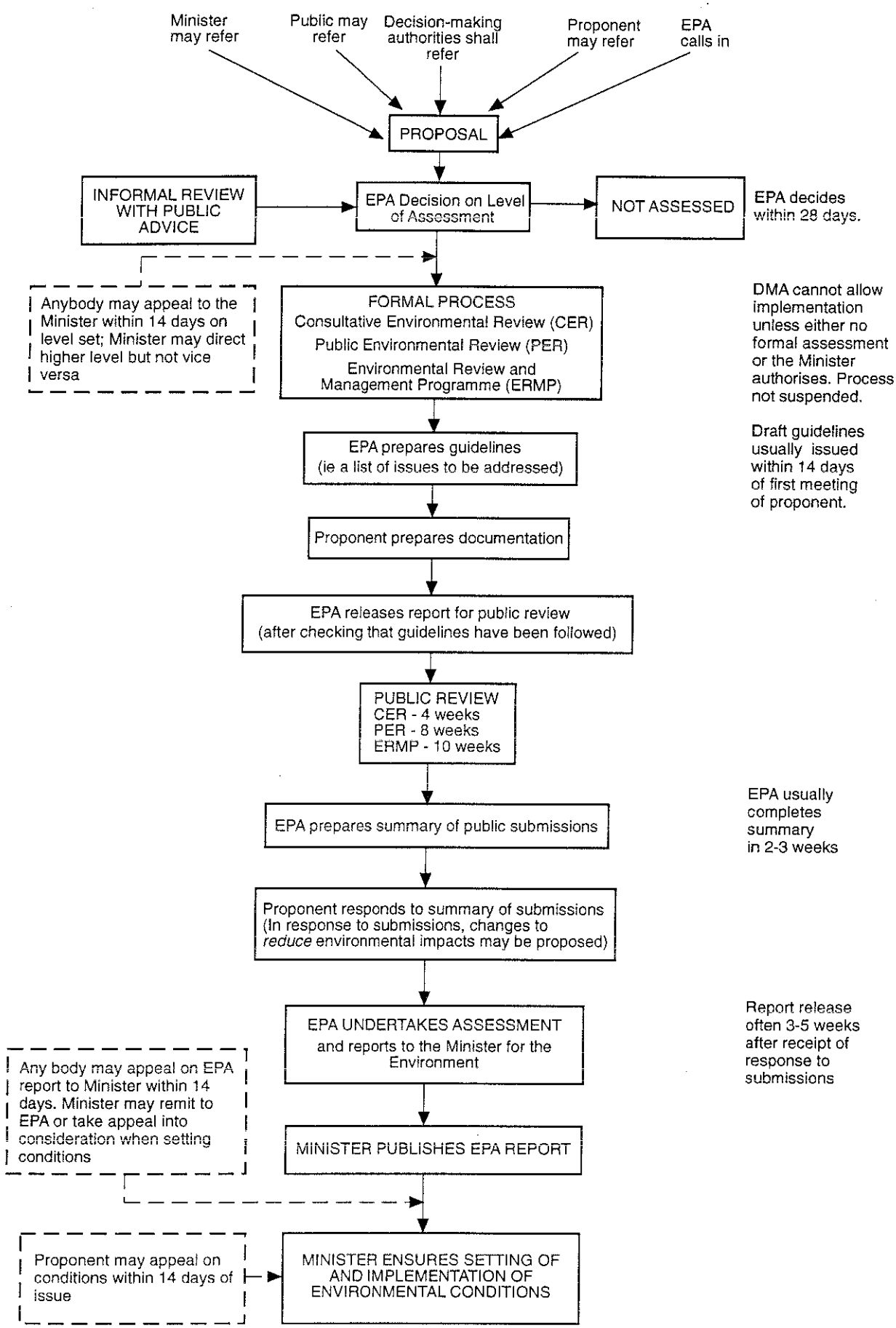
WNI (1996) AUSI Iron Project - Dredge Spoil Modelling. Letter report prepared for Dames & Moore.

Woodside Petroleum Development Pty Ltd (1979) North West Shelf Development Project, Draft Environmental Impact Statement and Environmental Review and Management Programme.

Appendix 1

Environmental impact assessment flow chart

EIA PROCESS FLOW CHART



Appendix 2

Summary of topics raised in submissions and proponents response to questions

Summary of topics raised in submissions and proponents response to questions

1.0 MARINE IMPACTS

1.1 a) What is the volume of dredge spoil required as fill for the overland conveyor?

b) How does this compare with the volume of dredge spoil involved in the capital dredging?

c) What is the expected frequency and volume of maintenance dredging?

d) What does the proponent propose to do with the dredge spoil from maintenance dredging?

e) On what is the Company's 15 year maintenance dredging cycle based (CER, p 7-21)?

The engineering studies that have been completed indicate that all of the dredge spoil from the initial dredging (250,000m^3) would be utilised within the overland conveyor.

As indicated in response to Question 1.8, the CER states that the estimated frequency of maintenance dredging is once every 15 years. The frequency of 15 years has been estimated by the Proponent's Engineering Contractor and is based on the available information for the area. The Proponent has not yet conducted the detailed engineering studies to quantify the volume of dredge spoil that will be created by the maintenance dredging. Prior to the first maintenance dredging operation being undertaken the Proponent will review its options regarding the disposal of the dredge spoil to ensure that current (at the time of the dredging) environmental procedures are applied to its disposal.

1.2 One of the environmental objectives for the company should be to ensure the maintenance of the marine biological productivity and diversity identified by the consultants to the east of Madigan Point. How does the proponent propose to achieve this?

Section 7.3.1 of the CER stated that the results of the marine biological survey were used during the selection of the final site for the loadout facility. On the basis of the marine survey the Proponent chose to relocate the proposed location of the loadout facility from the east side of Madigan Point to the west side. The major aim of this relocation was to minimise the potential impacts of the Project on the marine environs to the east of Madigan Point.

The Proponent also decided to reduce the length of the causeway to extend only part way along Madigan Point to reduce the impact of the causeway on the mangroves along Madigan Point and to minimise the disturbances to water flows in the vicinity of the point.

The Proponent believes that these measures will minimise the impact of the Project on the area to the east of Madigan Point.

1.3 Coral spawning occurs in autumn and corals may be near the limits of their thermal tolerance in summer. Turtles nest from late spring to early autumn.

a) Are there other marine biota which undergo periods of high environmental stress? If so when?

b) On the available information winter is the preferred period for dredging, and periods within a month of the coral spawning, and also during the turtle nesting period should be avoided. Does the proponent concur with this statement?

The marine biological survey undertaken in the vicinity of the Project Area did not show any other marine biota which regularly undergo periods of high environmental stress. However, it is likely that thermal stress also affects other organisms during summer. The actual location of the loadout facility was chosen to minimise the potential environmental impacts of the Project on the receiving environment and the marine survey showed that these areas had very little marine life. The Project will not affect any sandy beaches used for turtles during nesting.

Commitment 8 of the CER states that the Proponent will preferably undertake the dredging operations in the winter months. However, from a marine impacts point of view, the Proponent believes that the dredging operations can also be undertaken during autumn and spring.

1.4 There is insufficient information presented in the CER to gain an appreciation of the local currents and circulation patterns, and the basis for the hydrodynamic dispersion modelling.

a) Has there been any comparison of field data and model results?

b) Is the model actually able to resolve the seasonal differences presented in Figure 7.1?

WNI utilised field data for the region to verify the estimated current flows in the area and the estimated currents were used in the dispersion modelling. The Proponent is not aware of any comparison between field data and model results in relation to the dispersion model in the Project Area. However, the development of a model requires a process of evaluation and comparison and WNI (sub-consultants for this work) utilised an accepted and validated model.

WNI estimated the current movements (including tidal and wind driven) based on its knowledge and data available in the vicinity of the Project Area over the period of one year. These estimated currents were used to predict the seasonal differences presented in Figure 7.1 of the CER.

1.5 With respect to Commitment 9 (Page 7-24):

a) Is the environmental flow (eg. due to tide and wind) and the local water depth sufficient to prevent a local accumulation of effluent and to enable the WNI calculated jet/plume dilution to occur?

b) After initial dilutions and plume fall, is the discharge likely to be mixed through the water column, or be transported away from the area as a bottom layer?

The available information indicates that the local water depths and currents are sufficient to prevent local accumulation and for the calculated dilutions to occur. The modelling indicates that the plume would be diluted to less that 1ppt above the background salinity levels by the

time that the plume reaches the sea floor if discharged at the surface of a water body with a depth of 6m. Therefore, the modelling results indicate that the plume will not be transported away as a bottom layer.

1.6 With respect to Commitment 10 (page 7-26):

a) Is the Company prepared to maintain a quality controlled contaminants inputs inventory (flowrate, concentration and load) for all contaminants discharged to marine waters?

b) The spatial scale as well as the temporal frequency of monitoring should also be agreed with the EPA/DEP. Is the proponent agreeable to this?

c) An initial baseline survey would be extensive enough to determine evidence of other sources of contamination and to select control sites. Is the Proponent prepared to agree to this?

The Proponent will periodically monitor the concentrations of heavy metals, free chlorine and other marine water quality parameters in the marine discharge prior to its release. The quantity of water discharged will also be monitored on a regular basis through the circulatory system.

The proposed monitoring programme will be undertaken to the reasonable satisfaction of the EPA in consultation with DEP and CALM. As such the temporal frequency of the monitoring will be defined in discussions with the EPA, DEP and CALM.

The Proponent has committed to undertake the monitoring surveys in the vicinity of its operations and does not intend to undertake a larger regional scale monitoring programme. As stated in Commitment 10 the Proponent will assist in the identification of sources of contamination in the event that any contamination is attributed to its Project.

1.7 a) The TBT regulations under the EP Act prohibit coating fixed structures and pylons with TBT-based paints in bays and semi-enclosed waters. How does the proponent propose to control marine fouling?

b) One ship every three days may give rise to significant TBT contamination - but only monitoring will tell. The potential for this will be minimised if no boat maintenance is allowed on the jetty. Does the proponent propose to undertake monitoring and will boat maintenance be allowed on the jetty?

The proposed loadout facility will be located in open, well flushed waters.

The Proponent will use cathodic protection for corrosion control and anti-foulant coatings on submerged structures.

Anodes, usually comprised of metallic zinc, are designed to corrode away in preference to the steel structures they are designed to protect. The rate of release of the oxidised zinc is slow and in waters subject to strong currents and tidal movements the potential for increase in the waters adjacent to the facilities is also low. The impact of such increase is expected to be small due to the low biological activity in the immediate vicinity of the structures.

Coatings on submerged structures are mostly inert and include concrete and epoxy compounds. Antifouling compounds are generally only used on structures immersed for relatively short periods of time due to the need for re-coating at regular intervals which is generally not possible on permanently submerged structures. The coatings for these structures will be chosen on the

basis of several factors including the potential impacts on the environment, longevity and cost. These coatings will not contain TBT and the DEP, CALM and Department of Transport will be consulted during the selection process.

Periodic monitoring for TBT may be included within the monitoring programme committed to by the Proponent (Commitment 10) depending upon the results of an assessment of its potential for accumulation in the marine environment.

The Proponent does not envisage that any ship maintenance will be conducted at the jetty.

1.8 In relation to ballast water and the potential introduction of exotic organisms:

a) Will the shipping operations be coordinated by a Port Authority? If so will that Authority be encouraged to adopt the latest Guidelines of IMO or AQIS?

b) Should a watching brief be maintained on all shipping in respect of ballast water issues and practices?

The proposed loadout facilities are located outside of the Port Walcott (Cape Lambert) area which is controlled by Robe River Mining Company (Robe River) and is also outside of the area controlled by the Dampier Port Authority. Therefore, it is likely that the Proponent would have its own gazetted port area and manage its own day to day operations with overall coordination undertaken by the Department of Transport.

The Proponent understands that AQIS maintains a watching brief on all shipping in respect to ballast water issues and practices.

1.9 The provisions and precautions outlined in Section 7.3.11.1 for the handling and shipping of DRI are reasonable. Where does responsibility rest, if there is any environmental impact arising from such an incident.

Where the responsibility would rest in the event of an accident occurring during the loading of the DRI would depend upon the nature of the incident, where the incident took place and who was in control (eg. the Proponent or the Ship owners or the Master of the vessel) at the time of the incident.

1.10 Does Section 4.4.4 represent the limit of the proponent's knowledge of the local currents of Nickol Bay? If not more detail should be provided.

The current information was generated by WNI using its knowledge and data available in the vicinity of the Project Area. WNI utilised these data within its modelling while Section 4.4.4 summarised the major currents influencing the North Western Australian Coast.

1.11 The project is proposed for an area where there currently exists a managed prawn trawl fishery (14 licences), licensed fish trawling and an extensive recreational fishery. Any significant loss or contamination may affect these fisheries. Specifically:

a) How does the proponent propose to address the potential for contamination of water and sediments by:

i) antifouling and anti-scaling agents?;
ii) corrosion inhibitors?;
iii) heavy metals?; and
iv) oil and chemical spills?

b) What specific programme of monitoring and testing will be implemented to address the parameters identified in a) above, and what guidelines will be used to assess compliance?

c) What will be the composition of the anti-scalant and corrosion inhibitors, what quantities will be used and what quantity will reach the marine environment?

d) How does the proponent proposed to address the potential for nuisance organisms to be introduced through ballast water discharge?

e) How will prawn trawler access to the site be affected?

Commitment 10 states that the Proponent will undertake surveys of toxic contaminants that may occur in the effluent, particularly organic pollutants (eg. heavy metals), in the marine sediment and suitable biota from the area. These surveys would be undertake prior to commissioning and during operations with the frequency of testing to be decided in consultation with the EPA. The specific details of the monitoring programme have yet to be decided however it is likely that the ANZECC water quality guidelines would be applied to this programme. The Proponent also understands that ANZECC will be releasing draft guidelines for sediment contamination which may also be utilised.

Commitment 11 states that the Proponent will prepare an oil spill contingency plan for the Project prior to the commencement of operations.

The composition and quantity of the anti-scalant and corrosion inhibitors that will be used during the development and operation of this Project is unknown. However, Section 7.3.6 of the CER discussed the potential for heavy metal and organic contamination and concluded that the potential for contamination was small due to the design and management measures (such as metered dosing of anti-scalants) incorporated into the Project. Commitment 10 includes monitoring of these potential contaminants.

Section 7.3.11.6 of the CER addressed the issues associated with the discharge of ballast water which is controlled by the AQIS and local port authorities. As stated in the CER, the Proponent will stipulate that shipping companies using the loadout facilities comply with the International Guidelines for preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges.

The potential for dredging activities and ship turning to affect the local marine habitats was discussed in Sections 7.3.2 and 7.3.11.5 respectively. The CER concluded that the potential impacts of the dredging operations would be minimised through the use of a cutter suction dredge and preferably undertaking the dredging during the winter months. It was also concluded, on the basis of existing information, that the impacts associated with ship turning were expected to be minimal.

The potential impacts of the Project associated with the local fishing and prawning industry were discussed in Section 7.3.10 of the CER. This concluded that while the Project would disturb some trawling routes within the Project Area, the main trawling routes located on the western side of Nickol Bay will not be disturbed.

1.12 Will additional assessment be undertaken on the potential impact on marine wildlife in the area, including marine turtles and dugong? The marine turtles and dugong (Dugong dugong) are protected species listed under the Bonn Convention.

The loadout facility has been designed to minimise its impact on the environment. The proposed alignment of the jetty and shipping channel does not affect any of the areas used by Dugongs for feeding (seagrass areas) or by turtles for nesting (sandy beaches). Further, the open piled structure proposed for the loadout facility will result in only a small disturbance to ocean water movements in the area. Therefore, additional assessments are not warranted.

1.13 Section 7.3.8 (Protection of Marine Fauna) states that the effect of light spill on turtles will be minimised through the design of the lighting system and the use of low pressure sodium lights. Will the proponent liaise with CALM prior to developing the lighting plan?

The Proponent will liaise with CALM during the development of its lighting plan for the loadout facility.

1.14 The proposed site is adjacent to Dixon Island which is listed in the National Estate. The island is a significant seabird and turtle habitat. The proposal may have a significant impact on the marine environment of Dixon Island, in an area identified in the CER as having the highest coral cover in the project area.

(a) What is the likely frequency of maintenance dredging and how will potential impacts be managed?

(b) Is there the potential for Dixon Island to be impacted by other project related activities? If so, how will these impacts be managed?

Section 7.3.1 of the CER stated that it is estimated that maintenance dredging of the channel would be required at an interval of approximately 15 years. The maintenance dredging operations will be undertaken in a manner similar to the initial dredging but on a much smaller scale and the programme will be designed to minimise the environmental impacts associated with the loss of marine life and sediment transport.

The impacts of the Project on Dixon Island during the normal operations of the Project are expected to be small. The Proponent believes that the major potential impact on Dixon Island may occur in the event of an oil spill resulting from associated shipping activities. The Proponent has committed to prepare an oil spill contingency plan for the Project prior to construction (Commitment 11).

1.15 Local Aboriginal people have historically collected marine life from this area for food. Loss of mangroves will result in the loss of some of this resource. How does the proponent respond to this concern?

Approximately one hectare of land, comprising less than 50% of mangroves, will be cleared during construction of the overland conveyor and this represents only a very small proportion of the mangrove population in the Project Area. The mangroves in this area occur in scattered clumps on boulders along the southern half of the western side of Madigan Point and are in poor condition due to the unfavourable rocky growth stratum. As a consequence, these mangroves provide only limited habitat for marine species and therefore do not represent a significant loss of resource from this area. The impact of clearing this small area will be minimal and localised as this species is widely represented in the region. The extensive stands of mangroves which occur along the eastern side and northern end of the western side of

Madigan Point will not be cleared. These and other mangroves in the area are more favourably located, in better condition and provide a more extensive habitat for mangrove fauna which will ensure the maintenance of resources.

2.0 FLORA AND FAUNA

2.1 Desktop investigations have provided the bulk of the information on flora and fauna.

a) What level of survey has been undertaken in this area in the past?

b) What is the validity of using these records?

The key environmental features of the Project Area were described through a comprehensive combination of desktop and field investigations. The objective of these investigations was to collect sufficient data to determine whether the biophysical characteristics of the Project Area are typical of those found in the region.

The desktop investigations comprised:

- the collation and review of relevant environmental reports and other scientific literature, environmental data, maps and aerial photography;
- a search of CALM's Declared Rare and Priority Flora database and the Western Australian Museum's vertebrate fauna databases; and
- consultation with local organisations including officers from the DEP, CALM and Department of Fisheries.

The information collated during the desktop investigations was used plan the field investigations by providing an overview of the environmental characteristics of the region and identifying those areas or habitat types which may be of ecological significance and would require specific examination during the field investigations. However, the bulk of the information on all biophysical features (except fauna) was collected as a result of a comprehensive field programme.

A number of field surveys of the Project Area have been conducted by the Proponent as summarised below:

- evaluation of the three initial alternative sites for the Project on 27 May 1995 by a 2 person team;
- Central Plant Site conducted between 27 and 31 May 1995 by a two person team;
- current plant site, tailings dam, and previous service corridors between 26 July and 2 August 1995 by a two person team;
- proposed railway spur, gas pipeline and overland conveyor corridors between 29 January and 1 February 1996 by a two person team; and
- marine survey of the area in the vicinity of the proposed jetty, load-out facility and dredge areas completed on 3 and 4 January 1996 by a three person team.

The objectives of the surveys were to:

- describe the landform, soils, vegetation and flora of the Project Area;

- search for rare or other significant flora species;
- identify any areas affected by weeds; and
- identify any environmentally significant or sensitive habitats.

These surveys used the land systems classification of Payne and Tille (1992) as the framework for describing the main habitat types, but the vegetation of most of the Project Area was described in significantly more detail. This was achieved by undertaking vehicle and foot traverses of the Project Area and recording a range of physical and biological characteristics. These data were in turn used to identify the vertebrate fauna habitats present in the Project Area and to describe the fauna species known or likely to occur in the Project Area.

The results of these surveys were compared with the findings of other biological surveys undertaken in the Roebourne Plains area and coastal Pilbara region, including:

- the Department of Agriculture's 1:250,000 Roebourne Plains land systems survey (Payne and Tille, 1992);
- environmental assessments of four large sites in the Cape Lambert area which were assessed as part of the site selection for the proposed plant site (Dames & Moore, 1995);
- a detailed assessment of the Pilbara Energy Project's gas pipeline corridor from Karratha to Port Hedland, which included the proposed alignment of the AUSI Iron Project's natural gas pipeline (Dames & Moore, 1994);
- a flora and fauna survey of the Karratha Pipeline Extension for the Pilbara Energy Project (Dames & Moore, 1995);
- a preliminary investigation of the proposed Cape Lambert/Dixon Island Heavy Industry Site (Halpern Glick Maunsell, 1994)
- a vertebrate fauna survey of the Leslie Salt evaporation ponds (Ninox Wildlife Consulting, 1991);
- biological surveys undertaken for BHP's HBI Project (BHP, 1994);
- Port Hedland Heavy Industrial Site Study (BHP Engineering, 1994);
- the flora and fauna studies undertaken for the proposed Maitland Industrial Estate near Dampier (BHP Engineering, 1994);
- a study of the Onslow region (Storr and Harold, 1985);
- surveys undertaken for the North West Shelf Development Project (Woodside Petroleum Development Pty Ltd, 1979); and
- work undertaken in Mermaid Sound and the Dampier Archipelago by Forde (1985), Semenuik and Wurm (1987), Semenuik et al. (1982).

Desktop studies which use vegetation mapping and descriptions to describe the fauna habitats of a Project Area and to predict which species may use these resources is common to many formal assessments, particularly at the lower level of a CER. One of the main difficulties associated with undertaking a fauna field survey as part of the preparation of a CER is that the results of the survey would represent a "snapshot in time" of the status of the fauna assemblages resident in the Project Area at the time of the survey. It is unlikely that migratory, nomadic, cryptic or

rare fauna would be adequately sampled. Therefore, a systematic series of field surveys is required over a number of years and sampling all seasons. In the absence of these data, it is possible to describe the fauna habitats of the Project Area using the vegetation descriptions collated as a result of the field surveys and to predict the likely fauna assemblages using data from other surveys in the region. The validity of this approach depends on the reliability of the data and sampling methodology, and whether any taxonomic changes or changes to a species' conservation status have occurred since these surveys.

However, these difficulties do not negate the need for site-specific field surveys to confirm the results of the desktop studies and to facilitate the development of specific management strategies and procedures for significant species. Therefore, the Proponent will undertake a fauna survey of the Project Area, in accordance with Recommendation 3 of the AUSI Iron Project DR/HBI Assessment Report (EPA Bulletin 794). The scope of this survey would be determined in consultation with the EPA, DEP and CALM and would be undertaken prior to construction.

2.2 There has apparently been little or no field surveys in the region of the proposed site, particularly on coastal and wetland environments, as part of the CER.

a) Will thorough field surveys of the flora and fauna be undertaken?

b) What will be the nature and extent of these surveys?

As discussed in Question 1.1, the Proponent has already undertaken a number of terrestrial flora surveys of the Project Area. Further, a marine survey was also conducted of the areas likely to be affected by the jetty, load out facility and the surrounding environs.

Recommendation 3 of the AUSI Iron Project DR/HBI Plant Assessment Report (EPA, Bulletin 794) recommended that the Proponent undertake a fauna study of the Project Area. The Proponent plans to undertake this study prior to construction and the programme will be defined in consultation with the EPA, DEP and CALM.

2.3 Will specific surveys be conducted for threatened species listed in Schedule 1 of the Endangered Species Protection Act 1992 (ESP Act)? This would include the following species:

Endangered: Loggerhead Turtle (Caretta caretta):
Little Tern (Sterna albifrons);
Vulnerable: Mulgara (Dasycercus cristicauda) (about 170 km east of Wickham);
Vulnerable: Pebble-mound Mouse (Pseudomys chapmani) (about 60 km south of Roebourne);
Vulnerable: Black-flanked Rock-wallaby (Petrogale lateralis) (Depuch Island);
Vulnerable: Ghost-Bat (Macroderma gigas).

As stated in the above responses, the Proponent will undertake a fauna study of the Project Area. The scope of this study would be defined in consultation with the EPA, DEP and CALM and would be undertaken prior to construction.

2.4 The CER concludes that, as the vegetation types and vertebrate species identified in the region have wide distributions throughout the Pilbara, they are not considered to be of particular significance. This conclusion can lead to the misconception that widely distributed species and communities are secure and need no attention paid to their conservation. Such perceptions can be misleading however, as many widely distributed species are of conservation concern. The mulgara is an example. This

species is widely distributed across the arid-zone, but occurs with such irregularity and in such low numbers that it is listed as Vulnerable in the ESP Act. This species, which, like many others, was once widespread and common, has undergone a 50-90% decline in its range since European settlement. Each project assessment that so readily dismisses such species or ecological communities could contribute unwittingly to their further decline. How does the proponent respond to this concern?

The statement quoted from the CER was intended as a summary which stated that the flora and fauna of the Project area were widely distributed and common throughout the Pilbara. In reaching this conclusion, the conservation status of species found (in the case of flora) and thought to be in the area (in the case of fauna) were taken into consideration as indicated within the CER. For example, if Mulgara had occurred in or adjacent to the Project Area, the assessment procedures used by the Proponent within this Project would have determined that it was of significance and required special consideration.

2.5 **Because of the size of the proposed development, and the range of habitats it affects, especially the coastal habitats under tidal and cyclonic influences, will the proponent consult closely with wildlife experts in the Department of Conservation and Land Management to identify potential deleterious impacts on the natural environment, with particular attention given to the species identified above and their likelihood of being in the areas affected?**

The Proponent identified the potential deleterious impacts of the Project on the natural environment in consultation with DMA's such as CALM. The Environmental Management Plan for the Project will address the ongoing environmental management of the Project and will be developed in consultation with CALM. The EMP will also address any special considerations relating to the management of fauna identified by the fauna field study.

2.6 **The proponent must ensure that Australia's obligations under several international conventions and treaties are met. The following international agreements have relevance. For each agreement, Australia's obligations in this region are outlined:**

- **Japan-Australia and China-Australia Migratory Birds Agreements (JAMBA and CAMBA) - Australia is obliged to protect the habitat for species listed under these agreements.**

- **Convention on the Conservation of Migratory Species (Bonn Convention) - Australia is obliged to conserve all species listed in the Annexes to the Convention including conserving their habitat.**

- **Convention on Wetlands of International Importance (Ramsar Convention) - Australia is obliged to promote the wise use of all wetlands. effectively without causing a loss of their ecological characteristics.**

The CER identified various species of migratory bird that may occur in the project area. The majority of these species are listed under the two bilateral migratory bird agreements between the Australian Government and the Governments of Japan and China (JAMBA and CAMBA respectively). Given the migratory nature of these species it is unlikely that these species have permanent populations in the area. However, Australia is obliged to protect the habitat of those species listed under the agreement.

a) **How does the proponent propose to meet the above obligations?**

b) **Will additional survey be carried out to determine the significance of the sandy plains and samphire flat habitat and the possible impact on migratory birds?**

c) **Does the proponent propose to incorporate measures, such as the timing of construction activities, to minimise impact on these migratory species?**

The Project has been designed to minimise the environmental impacts of the Project including the areas of the environment covered by Australia's international conventions and treaties. The desktop fauna assessment undertaken for the Project concluded that the Project was unlikely to have a significant impact on any of the species protected under JAMBA and CAMBA. Therefore, the Proponent does not intend to undertake any further studies on the significance of the sandy plains and the samphire flat habitats to these birds. Due to the expected small areas likely to be impacted by the Project, the Proponent does not believe that any special measures, such as timing of construction phases, are necessary.

3.0 IMPACTS ON EXISTING SURFACE HYDROLOGY

3.1 Section 7.2.4.2 describes the design of culverts along the length of the rail spur. It indicates that the culverts will be designed to accommodate a 1 in 50 year storm/flood event. Is this acceptable in an area prone to cyclones or should culverts, crossings and bridges be designed to cope with a 1 in 100 year storm event?

The 1 in 50 return frequency has been selected in accordance with the Hamersley Iron design criteria used for its railways. This represents Hamersley Iron's operational criteria which is considered by Hamersley Iron through working experience to provide an adequate level of protection. The Proponent believes that this design criteria represents an acceptable level of risk for the protection of the proposed railway structure.

4.0 DUST AND PARTICULATE EMISSIONS

4.1 How will the proponent address the potential for dust generation during materials handling and shiploading?

The CER (Section 7.2.8) stated that dust generation from the overland conveyor transfer points would be controlled through the use of extractive air filtering systems. The dust generated during ship loading activities will be further minimised through the use of the "soft loading" procedures for DRI.

5.0 LIQUID AND SOLID WASTE DISPOSAL

5.1 Where will the Construction camp be located?

It is proposed to locate the construction camp approximately 1km north of the proposed Plant site within an area above the storm surge level.

5.2 All Construction camps must comply with the Construction Camp Regulations and details of waste disposal and potable water supply need to be addressed. Does the proponent propose to discuss these issues with the Shire of Roebourne?

The Proponent will comply all State and Local Government Regulations relating to waste disposal and potable water supply. The Proponent has, and will continue to, consult with the Shire of Roebourne on issues relating to the Project.

6.0 NOISE

6.1 It is recommended that, in relation to construction noise, the proponent provide the following information:

- **predicted sound power levels for typical construction machinery likely to be used;**
- **hours of operation of the construction works;**
- **predicted noise levels at the nearest noise-sensitive premises; and**
- **details of any noise emission specifications or restrictions on operating hours.**

Appendix D of Australian Standard 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites provides sound power levels associated with various pieces of site equipment. Table 1 summarises the sound power levels of selected construction equipment from AS 2436-1981.

TABLE 1

TYPICAL A-WEIGHTED SOUND POWER LEVELS FROM SITE EQUIPMENT
(AUSTRALIAN STANDARD 2436-1981 APPENDIX D)

Plant	Measured Range of A-weighted Sound Power Level (dB)
Cranes, crawler (100kW)	102 to 115
Excavator (100-200kW)	108 to 112
Generators (110kV.A)	< 108

The sound power levels associated with the piling activities will depend upon the type of pile driver used. Kaiser Engineers has advised the Proponent that the sound pressure levels (at 1m) expected from the pile driver will be between 90 and 100dB(A) which equates to a sound power level of between 98 and 108dB(A).

Wickham represents the closest noise sensitive receptors and is approximately 3km from the railway spur at the closest point. The jetty/loadout facility is approximately 6km from Wickham at its closest point. Table 2 presents the sound pressure levels calculated for distances of between 3 and 6km for a source with a sound power level of 115dB(A).

TABLE 2

CALCULATED SOUND POWER LEVELS AS A FUNCTION OF DISTANCE RESULTING FROM SOURCE WITH A SOUND POWER LEVEL OF 115dB(A)

Distance (m)	Calculated Sound Pressure Level (dB(A))
3,000	37
4,000	35
5,000	33
6,000	31

The calculations presented in Table 2 are conservative as no account has been taken of barrier effects from the intervening terrain and vegetation. The detailed noise modelling undertaken within the original CER for the AUSI Iron Project (Dames & Moore, 1995) showed the significance of the hills between the site and Wickham in reducing the noise impacts associated with the Project.

The results presented in Table 2 show that construction noise associated with the railway may approach the DEP night-time criteria under this worst case prediction scenario only at its eastern extremity. However, at this stage it is envisaged that the railway construction activities will occur between 6am and 6pm on a six day working week or a 13 day working fortnight.

The construction of the jetty and loadout facility is expected to be conducted 24 hours a day, seven days a week until completed. However, it is expected that the actual pile driving will take place for a very small percentage of the time as the physical hammering to drive pile pairs for each cantilever section is anticipated to take less than one hour. Therefore, on the basis of the modelling results presented in Table 2, the distance between Wickham and the piling operations, the anticipated sound power levels from the pile driver and the low percentage of time associated with the piling operations, it can be concluded that the noise impacts of the these operations will be acceptable.

In the event of unacceptable noise levels occurring in Wickham as a result of the construction activities associated with the Project, the Proponent will investigate the source of the noise and undertake remedial action. Appendix E of AS 2436-1981 summarises some of the remedial options available to the Proponent in this event.

6.2 It is recommended that Commitment 6 to comply with the requirements of the current regulations be revised to refer to the Proposed Environmental Protection (Noise) Regulations.

The Proponent has modified Commitment 6 as follows.

COMMITMENT 6
The Proponent will ensure that noise from the Project will comply with the requirements of the current *Noise Abatement (Neighbourhood Annoyance) Regulations 1979*. The Proponent will also comply with the *Environmental Protection (Noise) Regulations* when these are regulations are promulgated. If noise levels attributable to the Project exceed EPA criteria, the Proponent will take measures to minimise the impacts.

7.0 RISKS AND HAZARDS

7.1 The CER for the infrastructure requirements foreshadows the handling and shipping of DRI (page 7-28). This means that the scope for the original plant (contained in the CER dated September 1995) does now not include a briquetting plant. By not briquetting the DRI, new hazards and risks are introduced which are:

- **reactivity of the DRI with water, water vapour, rain water (not just seawater as implied in Section 7.3.11.1) means there is a serious risk of hydrogen generation;**
- **hydrogen very readily forms explosive mixtures, and any minor leak can readily ignite, leading to a fire risk and the risk of explosion;**
- **fire and explosive risks of the DRI within the ships containers, on conveyor belts, and on the loadout facility; and**
- **the potential for asphyxiating atmospheres in storage spaces.**

a) Is the proponent prepared to make additional commitments for the DRI Conveying System (c.f. the commitments made for Plant Operation and the Natural Gas Pipeline)? If so, these commitments should be documented and should include the definition of Hazardous Zones around the conveying system, and safety and emergency management plans with respect to dust emission, fire and explosion hazards.

b) Is the proponent prepared to make additional commitments for Ship Loading and Embarkation? If so, these commitments should be documented and include procedures to prevent the risk of fire or explosion, in particular due to contact of moisture in any form, eg rain or seawater, with the DRI, maintenance of inert atmospheres in ships holds, and safety and emergency management plans with respect to dust emission, fire, explosion, or damage to a ship at the jetty or in the proximity of the coastline where environmental damage may result.

The Proponent will conduct a HAZOP prior to the final design and commissioning of the plant. The HAZOP will include the handling, storage and shipping of DRI. Hazardous zone classifications will also be defined for areas of the plant, including the overland conveyor.

Section 7.3.11.1 of the CER summarised the International Marine Organisation Regulations that would be applied to minimise the risks associated with the handling of DRI. Adherence to these procedures means that the handling and transport of DRI can be undertaken safely.

The Proponent has added the following two new commitments.

COMMITMENT 14
The Proponent will undertake a HAZOP study and have hazardous zone classifications for areas of the Project. This work will be completed during the detailed engineering design phase and to the reasonable satisfaction of the EPA.

COMMITMENT 15
The Proponent will adopt the International Marine Organisation Regulations (1981) for the handling and shipping of DRI which includes monitoring of hydrogen gas concentrations

within the cargo spaces. This will be undertaken to the reasonable satisfaction of the EPA and the DME.

7.2 Will the proponent develop contingency plans for fire explosion risks dealing with vessels at the jetty? These need to be submitted for review. These plans need to consider aspects such as how the company will deal with a hydrogen fire or explosion, or the situation where a ships hold fills with hydrogen.

Contingency plans for dealing with fires associated with the Project (including hydrogen fires during ship loading) will be developed by the Proponent during the detailed engineering design and form part of the overall emergency response plan for the facility. This plan would be submitted to the DME and local Emergency Response Groups for review prior to implementation.

8.0 SOCIAL ISSUES

8.1 Concern has been expressed that the overland conveyor alignment will encroach onto the Cleaverville Beach on the west side of Madigan Point. This location is regarded as having Aboriginal significance due to the previous occurrence of a fish trap. Will the proposed development impact on this area, specifically the beach identified?

The decision to align the overland conveyor on the west side of Madigan Point was made to reduce impacts on nearby Aboriginal heritage sites and marine habitats. The Proponent has had discussions with the Nanga-Ngoona Moora-Joorga Land Council and members of the Aboriginal community to determine areas of Aboriginal significance and to avoid unintentional intrusion or damage to Aboriginal heritage sites throughout the Study Area. The Proponent has undertaken extensive archaeological and anthropological Aboriginal heritage surveys within all of the Project Areas.

The centre portion of Madigan Point was identified as a significant area due to the presence of rock engravings and its contemporary use for fishing by local Aboriginal groups. In addition, the eastern side of the point was found to contain a reasonable coverage of corals during the marine studies. To minimise the potential environmental impacts to aboriginal heritage sites and the corals, the Proponent decided to locate the overland conveyor to the west of the centre line of Madigan Point. This re-alignment was also requested by the Aboriginal Community.

Some environmental impacts will be unavoidable but will be minimised by using a piled trestle jetty design from mid-way along the Madigan Point to the shiploader, as opposed to an extended causeway design. Disturbance to biota in the vicinity of the jetty alignment is expected to be minimal as the area is of low productivity and supports minimal burrowing infauna.

The Project is not expected to have any impacts on Cleaverville Beach, which is located approximately 5km west of the proposed plant site.

8.2 Access to Cleaverville Beach is currently via a track which will be traversed by the railway and gas pipeline. Will the current level of public access to this beach be maintained following construction of the project? If so, how?

The railway and gas pipeline alignments will not change the public access route to the Cleaverville Beach which is via the North West Coastal Highway and an unsealed road heading north to Cleaverville Beach from the highway. A level crossing will be provided where this track and the railway spur will cross this track. The gas pipeline would be buried and therefore would not represent a problem.

8.3 Will road access for the site be accommodated within the railway corridor?

Where practical, the road access for the site will be accommodated within the railway corridor.

8.4 Will the site access road be open to the public? If so, is there an opportunity to extend the road to Wickham?

The access road will be a private road that will be open to the members of the public holding an access permit obtained from the Proponent. The Proponent is continuing discussions with the Local and State Government on the possibility of extending the road to Wickham.

8.5 The cultural significance of Dixon Island has not been assessed. Is assessment necessary and does the Project have the potential to impact on parts of the island where culturally significant sites may be found?

The Project is not expected to result in any direct impacts on Dixon Island and any indirect impacts (eg. sedimentation during dredging) will be minimised during the construction and operation of the Project. Therefore, this type of cultural assessment is not required. However, the Proponent has also undertaken numerous discussions with the Nanga-Ngoona Moora-Joorga Land Council which has not raised any concerns about potential cultural impacts of the Project on Dixon Island. Therefore, the Proponent believes that impact of the Project on the cultural significant of Dixon Island is unlikely.

9.0 OTHER ISSUES

9.1 In most instances, the reader is advised that the proponent will minimise impacts and details will be given in the Environmental Management Programme (EMP). It is stated in the CER that the EMP will be prepared prior to the construction of the AUSI Iron Project and associated infrastructure. Will this EMP cover only issues related to construction activities?

The Proponent will prepare a three stage EMP for the Project as follows:

- Stage 1: Construction;
- Stage 2: Pre-commissioning; and
- Stage 3: Operations.

Stages 2 and 3 of the EMP will be prepared in accordance with Recommendation 2 of the EPA's Assessment Report for the AUSI Iron Project DR/HBI Plant (Bulletin 794).

9.2 What will be the volume of material excavated from borrow pits and the likely number or size of these pits?

The exact volume of material excavated from borrow pits and the number, size and location of these pits will not be confirmed until the detailed geotechnical and engineering design studies have been completed. Any borrow pits utilised for the construction of the Project would be managed and rehabilitated using the methodologies presented in Section 7.2.11.3 of the CER.

9.3 To minimise the fragmentation of land, where possible, the gas pipeline should be co-located within existing pipelines which traverse the area. Is this the case?

The CER states that the new pipeline will be located in the same corridor as existing pipelines (ie. Robe River Mining Company's Karratha to Cape Lambert gas pipeline and Pilbara Energy Pty Limited's Dampier to Port Hedland gas pipeline) wherever practical.

Appendix 3

List of submitters

1. Mr Wilfred Hicks
2. Fisheries Department of WA
3. Department of Conservation and Land Management
4. Department of Minerals & Energy WA (Mining Operations Division)
5. The Department of Transport
6. Shire of Roebourne
7. Australian Nature Conservation Agency
8. Australian Heritage Commission
9. Robe River Mining Co Pty Ltd

Appendix 4

Proponent's consolidated list of commitments

Proponent's consolidated list of commitments

COMMITMENT 1

Prior to construction of the Project, the proponent will prepare an Environmental Management Programme, in consultation with the DEP and CALM, to the reasonable satisfaction of the EPA. The EMP will be incorporated into the AUSI Iron Project EMP to ensure reliable and consistent application and review. [Timing - Developed in the pre-construction phase].

The Proponent will also incorporate the components of this Infrastructure Project into the AUSI Iron EMP recommended by the EPA as part of it's assessment report for that Project. [Timing - Implemented during the construction phase].

COMMITMENT 2

The Proponent will progressively rehabilitate disturbed areas to minimise disturbance of biological communities. The rehabilitation will be completed to the reasonable satisfaction of the EPA. [Timing - On-going]

COMMITMENT 3

The Proponent will use the dredge spoil as fill in the construction of the overland conveyor. The onshore settling ponds for the dredge spoil will be designed to minimise the return of salt and silt to the ocean. These procedures will be undertaken to the reasonable satisfaction of the EPA in consultation with the DEP. [Timing - Construction phase].

COMMITMENT 4

The Proponent will implement dust mitigation measures including containment and suppression during construction of the Project, to the reasonable satisfaction of the EPA in consultation with the DEP and the Department of Minerals and Energy. [Timing - Construction phase].

COMMITMENT 5

The Proponent will minimise dust generation during the operation of the conveyor by covering the conveyor and using air extraction filtering systems at the transfer points to the reasonable satisfaction of the EPA in consultation with the DEP and the Department of Minerals and Energy. [Timing - Operation phase].

COMMITMENT 6

The Proponent will ensure that noise from the Project will comply with the requirements of the current *Noise Abatement (Neighbourhood Annoyance) Regulations 1979.* The Proponent will also comply with the *Environmental Protection (Noise) Regulations* when these regulations are promulgated. If noise levels attributable to the Project exceed EPA criteria, the Proponent will take measures to minimise the impacts. [Timing - On-going].

COMMITMENT 7

The following commitments are made relating to the construction and operation of the gas pipeline:

- construction in accordance with AS 2885 - 1987;
- a separation distance between the lateral natural gas pipeline and residential properties of approximately 150m. These distances are based on a preliminary estimation of risks and are considered to be conservative;
- marking of the pipeline route;
- regular patrols of the pipeline (including walking, road and aerial patrols);
- development of a joint Emergency Response Plan for all pipelines in the proposed corridor;
- communication with adjacent landowners;

- use of appropriate corrosion protection and detection (internal and external); and
- use of appropriate depth of cover.

This will be completed to the reasonable satisfaction of the EPA and the Department of Minerals and Energy. [Timing - Construction and operation phases].

COMMITMENT 8

Dredging operations will be conducted preferably during winter, with autumn and spring the next preferred seasons, to minimise sedimentation to the reasonable satisfaction of the Department of Transport and the EPA. [Timing - Construction phase].

COMMITMENT 9

The Proponent will discharge the desalination plant flushing water using a seawater surface based diffuser. The discharge system will be designed to minimise any potential environmental impacts to the reasonable satisfaction of the EPA in consultation with the DEP and CALM. [Timing - Detailed engineering design phase].

COMMITMENT 10

Prior to commissioning, the Proponent will undertake a survey of toxic contaminants that may occur in the effluent, particularly organic pollutants (eg. heavy metals), in the marine sediment and suitable biota from the area. Following commissioning, the Proponent will periodically undertake further testing to assess the impact of the Project. The frequency of the testing will be decided in consultation with the EPA and all sampling results will be supplied to the EPA on an annual basis.

In the event that unacceptable levels of contamination are identified and are shown to be attributable to the AUSI Iron Project, the Proponent will:

- assist in the investigations to identify the source;
- undertake remedial action on its plant if it is the source of contamination; and
- remediate the impacted area if its plant is the source of contamination.

This will be completed to the reasonable satisfaction of the EPA in consultation with the DEP and CALM. [Timing - Construction and operation phases].

COMMITMENT 11

The Proponent will prepare an oil spill contingency plan for the Project prior to the commencement of operations to the reasonable satisfaction of the EPA. [Timing - Prior to construction].

COMMITMENT 12

The Proponent will undertake an ethnographic and archaeological survey of the Project Area and obtain all approvals required by the *Aboriginal Heritage Act* (1972-1980). This survey will be undertaken prior to the construction of the Project and to the reasonable satisfaction of the Department of Aboriginal Affairs. [Timing - Prior to construction].

COMMITMENT 13

The Proponent will address Aboriginal heritage issues in the induction programme to increase awareness of Aboriginal culture and will provide training and employment opportunities for Aboriginal people during the construction of the Project. [Timing - Construction phase].

COMMITMENT 14

The Proponent will undertake a HAZOP study and have hazardous zone classifications for areas of the Project. This work will be completed during the detailed engineering design phase and to the reasonable satisfaction of the EPA.

COMMITMENT 15

The Proponent will adopt the International Marine Organisation Regulations (1981) for the handling and shipping of DRI which includes monitoring of hydrogen gas concentrations within the cargo spaces. This will be undertaken to the reasonable satisfaction of the EPA and the DME.

COMMITMENT 16

Any potential impacts associated with the water used for the hydrostatic testing of the gas pipeline would be limited by retaining or re-using the water wherever possible and using chemicals that break down to benign compounds upon exposure to air in accordance with current industry practice. This would be undertaken during construction and to the reasonable satisfaction of the EPA.

COMMITMENT 17

The Proponent would ensure that there is no net loss of mangroves due to the Project. The placement of a small groyne perpendicular to the seaward end of the causeway is expected to result in the formation of a sand beach which would be expected to provide a suitable environment for natural establishment of mangroves in this area. However, in the event that the natural establishment of mangroves has not commenced within three years from the commissioning of the conveyor, the Proponent would plant replacement mangroves on the fringes of existing mangrove communities in the vicinity of the Project Area. These activities would be undertaken to the reasonable satisfaction of the EPA.

COMMITMENT 18

The Proponent would liaise with CALM during the development of the lighting plan for the load-out facility. This would be undertaken to the reasonable satisfaction of the EPA in consultation with CALM.

COMMITMENT 19

The Proponent would select the final easements for the rail spur and gas pipeline based on engineering (eg. amount of cut/fill, and width of river crossings), environmental (eg. flora, fauna, surface hydrology and Aboriginal Heritage) and cost constraints. This would be undertaken to the reasonable satisfaction of the EPA.

COMMITMENT 20

The rail spur would be constructed using conventional engineering design practices. These practices, including compaction of fill and the use of drainage culverts, would minimise wind and water erosion of the rail embankments. This would be undertaken to the reasonable satisfaction of the EPA.

COMMITMENT 21

Operationally, the Proponent would ensure the safety of the rail spur which includes the minimisation of scouring and undermining of the embankments. The maintenance of the rail spur line would identify and rectify any areas that have been affected by wind and water erosion. This would be undertaken to the reasonable satisfaction of the EPA.