Cape Lambert Port B

Pilbara Iron Pty Limited

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia

Report 1357
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Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
17/12/07	Level of Assessment set (date appeals process completed)	
13/4/09	Proponent Document Released for Public Comment	71
9/6/09	Public Comment Period Closed	8
31/3/10	Final Proponent response to the issues raised	42
6/5/10	EPA report to the Minister for Environment	5
10/5/10	Publication of EPA report	4 days
24/5/10	Close of appeals period	2

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Pilbara Iron Pty Limited, to construct and operate a second port at Cape Lambert. The port will process and export up to 130 million tonnes of ore per annum (Mtpa).

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- The key environmental factors identified in the course of the assessment; and
- The EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Terrestrial fauna.

(b) Marine values:

1. Light spill;
2. Dredging;
3. Underwater noise; and
4. Marine pest species.

(c) Dust.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

(a) The principle of conservation of biological diversity and ecological integrity;

(b) The precautionary principle;

(c) The principle of intergenerational equity; and

(d) The principle of minimization of waste.

Conclusion

The EPA has considered the proposal by Pilbara Iron Pty Ltd to construct and operate a second port at Cape Lambert to process and export up to 130 Mtpa of iron ore.

Terrestrial fauna

The proposal includes the clearing of up to 19.2 hectares (ha) of land which is equivalent to 4.1 % of the mainland habitat of the lizard *Lerista nevinae.* The mainland distribution of this species is restricted to 471.9 ha. Although the conservation status of *L. nevinae* has not been formalised, its very restricted distribution within unprotected areas could result in its eligibility to be listed as a Schedule 1 species under the *Wildlife Conservation Act 1950* and as a vulnerable species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPA considers that provided the remaining 70.3 ha of *L. nevinae* habitat within the mining lease is actively managed and protected, the loss of up to 19.2 ha is unlikely to alter the conservation status of *L. nevinae*. To address this issue the EPA has recommended Condition 5 which limits the amount of habitat that can be cleared and provides for active management to ensure habitat values are maintained.

Marine ecosystems

The proposal would result in light spill over the ocean and at the adjacent flatback turtle (*Natator depressus*) rookeries at Bell's Beach and Cooling Water Beach. The EPA notes that the proponent has committed to minimise light emissions through initial site design and the ongoing monitoring of light spill and turtle behaviour to identify areas where adjustments to lighting design are required. The EPA also notes that:

- Flatback turtles are listed in Schedule 1 of the *Wildlife Conservation Act* 1950 and as vulnerable under the EPBC Act;
- the number of turtles nesting on rookery beaches at Cape Lambert represents only about 1 to 1.5 percent of the north west shelf population of flatback turtles;
- some turtles move between rookery beaches which indicates that animals may have some capacity to adjust to disturbance;
- turtles are known to continue nesting on illuminated beaches where both the nesting females and emerging hatchlings are vulnerable to being attracted towards artificial lights located inland.

Based on this information, the EPA considers that, with the implementation of Condition 6, to manage and limit light spill from Port B, the proposal would not significantly impact flatback turtle populations on the north west shelf.

Noise emissions from pile driving can cause death or injury and can influence the behavior and communications of marine vertebrates. The EPA considers that with the implementation of:

- mitigation initiatives, including soft start procedures and the cessation of piling at night during sensitive wildlife breeding and migration seasons; and
- a reactive management framework that includes the engagement of a Marine Fauna Observer and the cessation of piling operations if sensitive wildlife approaches within defined exclusion zones,

that the impacts to marine vertebrates from noise emissions can be managed within acceptable levels. Condition 7 is recommended to address this issue.

In relation to dredging operations, the EPA notes that:

- the predicted permanent losses of benthic primary producer habitats (BPPHs) are well within the percentage areas outlined in the Environmental Assessment Guideline, *Protection Of Benthic Primary Producer Habitats In Western Australia's Marine Environment* (EPA, 2009);
- additional areas of BPPHs disturbed by turbidity and sedimentation from the dredge plume are expected to recover after cessation of the dredging program; and
- the proponent has committed to implement a reactive management program to ensure that coral mortality management targets are not exceeded.

The EPA is therefore satisfied that with the implementation of Condition 8, direct impacts from clearing of benthic communities and indirect impacts from dredging operations would not result in significant losses of BPPHs.

The EPA notes that the introduction of marine pest species has the potential to cause significant and widespread impacts to natural marine communities and to commercial fisheries and aquaculture in the Cape Lambert area. It is the EPA's view that:

- with the implementation of inspection and clearance procedures for construction vessels and equipment;
- the proponent's commitment to undertake regular marine pest monitoring; and
- international efforts to minimise the risk of pest species introductions through the discharge of ballast water,

the risk of pest species incursions at Port B can be managed to within levels that do not exceed the risks at other Pilbara ports. Condition 9 is recommended to address this issue.

Dust

The EPA considers that the existing Dust Management Plan will require substantial revision to incorporate the Port B operations. Modelling additional activities that will result from the Port B development has predicted only a minor increase in dust levels at Point Samson and Wickham. The EPA considers that with the implementation of recommended Condition 10, which provides for the upgrading of the existing Dust Management Plan, the impacts of dust can be managed.

The EPA concludes that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

Other advice

The EPA advises that the establishment of a buffer zone and conservation area between Cape Lambert and the town of Point Samson would both buffer the township from industrial noise and dust emissions and protect over 40 ha of *Lerista nevinae* habitat (a conservation significant species with restricted range). This area is currently a Ministerial Reserve vested in the Minister for State Development for industrial purposes and is currently zoned for Strategic Industry under the Shire of Roebourne Town Planning Scheme Number 8. The EPA has been informed that the Shire, the proponent, and the Department of State Development have been reconsidering the future of this Reserve and agree that the majority of the area should

be re-designated to provide a landscape buffer between the Cape Lambert industrial development and the township of Point Samson.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for the construction and operation of iron ore processing and port facilities at Cape Lambert with a throughput capacity of up to 130 Mtpa;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments;
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report; and
5. That the Minister notes the EPA's other advice presented in Section 5 in relation to the establishment of a buffer zone and conservation area between Cape Lambert and the town of Point Samson.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Pilbara Iron Pty Limited to construct and operate a second port at Cape Lambert is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) Terrestrial fauna: limiting the amount of *Lerista nevinae* habitat that can be cleared to a total of 19.2 ha and providing for active management to ensure habitat values are maintained.
b) Light spill impacts on turtles; design and management of lighting to prevent lightspill to important turtle nesting areas
c) Underwater noise: the use of soft start up procedures to allow time for marine fauna to move away, ensuring dedicated marine observers are present during pile driving activities and ceasing of pile driving if whales and turtles are observed.
d) Dredging: ensuring that permanent loss of BPPH does not exceed 0.7 hectares.
e) Introduced marine pests: monitoring of vessels to detect if marine pests are present and development of management strategy in the event they are detected.
f) Dust: ensuring the Dust Management Plan that applies at the existing adjacent port operations incorporates the new facilities and throughputs.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles associated with the proposal by Pilbara Iron Pty Limited (Pilbara Iron), a subsidiary of Rio Tinto Iron Ore product group, to construct and operate a second port at Cape Lambert. The port will process and export up to 130 million tonnes of ore per annum (Mtpa).

Cape Lambert is located on the Pilbara coast, five kilometers (km) west of the Point Samson community and six kilometres north-north east of the town of Wickham. Pilbara Iron operates an existing iron ore processing and export facility at Cape Lambert. The infrastructure associated with these operations is referred to as Port A. Ministerial approval to upgrade the throughput capacity of Port A to 85 Mtpa was granted in Statements 741 and 743 in mid 2007.

The current report addresses the proposed development of Port B that would be located adjacent to, and west of, Port A. Port B includes separate iron ore processing and storage facilities located along the west coast of Cape Lambert. Marine components of Port B include a new 2.1 km, four-berth jetty with associated dredged channels and turning circles.

The Port B development proposal was referred to the EPA on 14 November 2007 and the level of assessment was set at Public Environmental Review (PER) on 17 December 2007. The PER document was made available for a public review period of eight weeks from 13 April 2009 to 9 June 2009.

The proposal is being assessed at a level of Public Environmental Review (PER) because:

- the proposal footprint would impact the coastal dune habitats of *Lerista nevinae* lizards which have a very restricted range between Cape Lambert and Dixon Island;
- light spill, dredging and intensive noise emissions from pile driving have the potential to disrupt marine turtles which inhabit the waters and nest on beaches adjacent to the proposed development;
- a large dredging program and ongoing port operations have the potential to reduce water quality and disrupt benthic primary production;
- specialised construction vessels and bulk carriers from other ports pose a risk of introducing marine pest species; and
- the cumulative impacts of dust from Ports A and B have the potential to impact communities at Point Samson and Wickham.

The proposal includes matters relevant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* including listed threatened species, migratory species, dredge waste disposal, and Commonwealth marine areas. The Cape Lambert Port B development proposal is being assessed independently by the Commonwealth Government in relation to these matters.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

The proposal is to construct and operate a second port (Port B) at Cape Lambert to process and export up to 130 Mtpa. Ore would be transported to Cape Lambert by rail requiring between 18 and 21 train arrivals at Port B per day. Rail wagons would be unloaded by car dumpers and the ore transferred to stockpiles via conveyors and stackers. To load ships, ore would be transported along the jetty on conveyors and transferred to bulk carrier vessels by ship loaders. The wharf would provide four berths to accommodate 250,000 dryweight tonnage ships. It is anticipated that 600 to 800 ships would load iron ore at Port B annually.

The onshore components of Port B include:

- ore handling facilities, incorporating rail tracks, car dumpers, conveyors, stackers, stockyards, reclaimers and screenhouses;
- supporting operational infrastructure, including offices, warehouses and workshops; and
- supporting construction infrastructure, including laydown and storage areas.

The Marine components of Port B include:

- an access jetty and wharf, plus shiploaders; and
- dredging and spoil disposal for berth pockets, turning basins, a departure channel and tug harbour.

Construction is expected to take three to four years. The port would operate 24 hours per day, seven days a week.

The main characteristics of the Cape Lambert Port B proposal are provided in section four of the PER (SKM, 2009) and the supplementary report outlining the wharf relocation (SKM 2009c). The main characteristics are summarised in Table 1 below. Figures 1 and 2 provide a regional perspective, and outline the proposal boundary, the extent of dredging operations and vegetation clearing, and the proposed zone of moderate level of ecological protection.

The proposal was the subject of a section 43A application to change the proposal before the EPA reported. This application related to minor changes to the project boundary that included areas on the eastern margin of the terrestrial envelope, totaling 19 ha, not previously included in the Public Environmental Review document. The proponent provided information on vegetation, flora and fauna within the additional

area. This information has been considered as part of this report. No additional impacts were identified.

Table 1 - Summary of key characteristics of the Port B proposal

Element	Description
Life of project	At least 50 years
Iron ore throughput capacity	Up to 130 Mtpa
Stockyard capacity	Storage to accommodate up to 130 Mtpa
Total footprint of land-based activities	340 ha
Total area of vegetation clearing within the footprint	300 ha
Dredging: (a) Maximum volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension (b) Maximum area of seabed to be dredged (c) Dredging depths: - berth pockets - approach/departure channel - turning basins (d) Duration of dredging program.	 Up to 14 Mm^3 320 ha -20 metres Chart Datum -16 metres Chart Datum -10 metres Chart Datum Approximately 52 weeks
Dredge disposal: (a) Number of spoil grounds in State waters (b) Dimensions of spoil ground (c) Volume of dredge spoil to be disposed of in Western Australian State Waters (d) Amount of dredge spoil to be disposed of on shore	 1 2 km long by 1 km wide. 6.06 Mm^3 0 Mm^3
Duration of pile driving operation	Approximately 52 weeks
Access jetty and wharf : (a) Design (b) Length	 Open trellis design allowing water flow beneath Up to 2.2 km (from conveyor junction on land to end of wharf)

Abbreviations

Mtpa million tonnes per annum
ha hectares
Mm^3 million cubic metres
km kilometre

The potential impacts of the proposal initially predicted by the proponent in the PER document entitled *Cape Lambert Port B Development, Public Environmental Review and draft Public Environmental Report* (SKM, 2009) and their proposed management is summarised in Table ES-1-3 in the Executive Summary of the proponent's document.

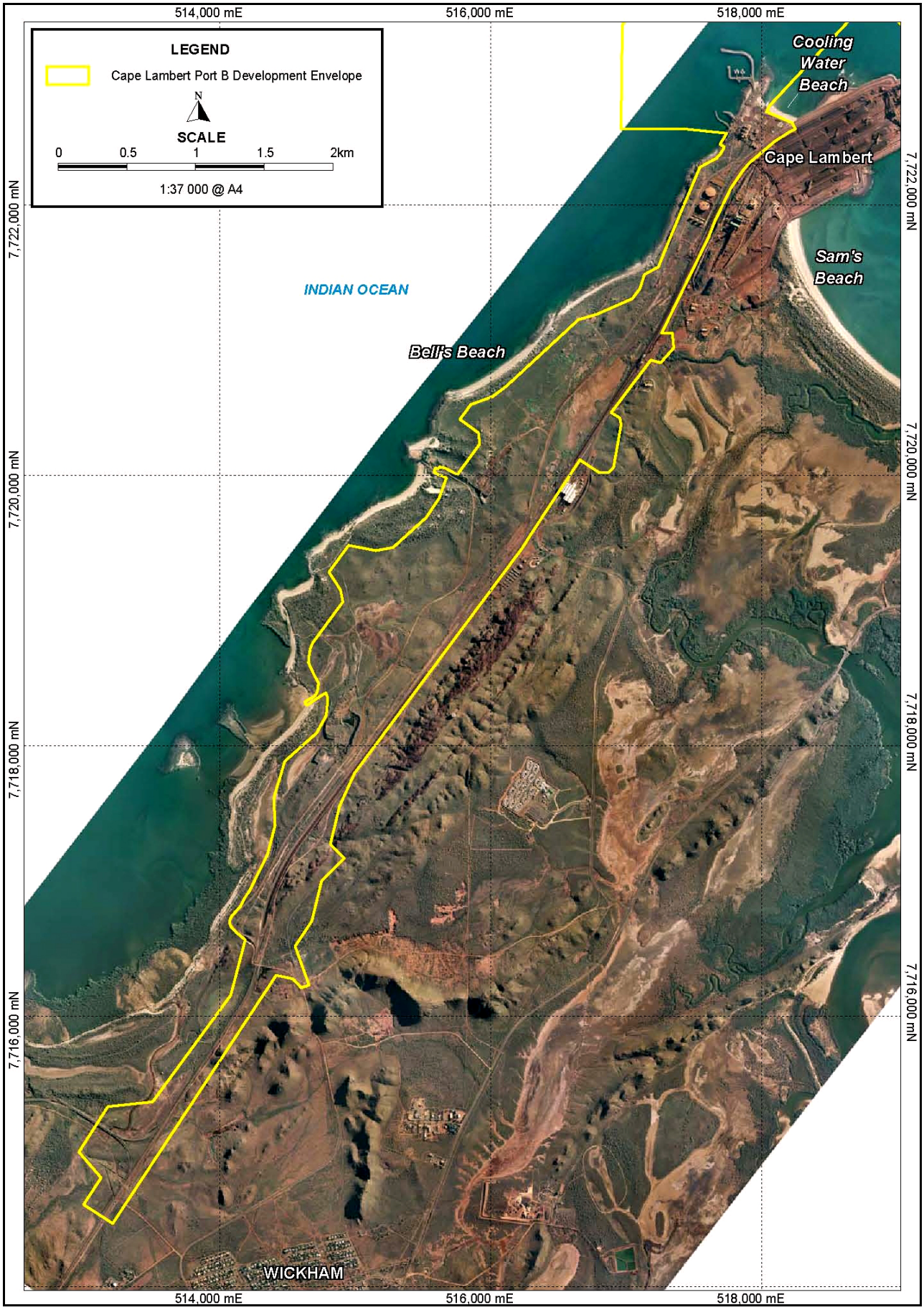

Figure 1 Terrestrial component of Cape Lambert Port B

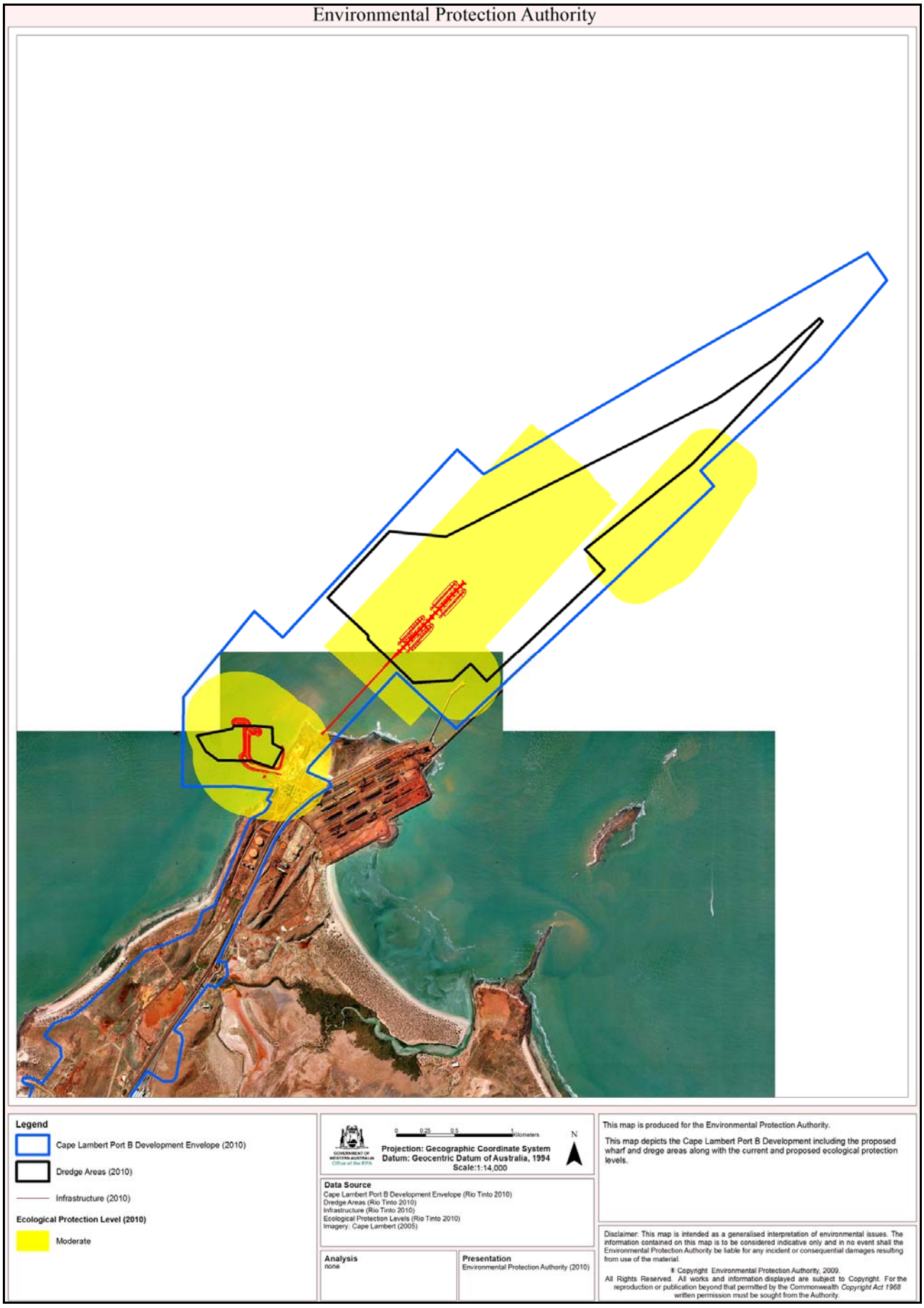

Figure 2: Marine component of Cape Lambert Port B

3. Key environmental factors and principles

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

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as flora and vegetation, and water resources, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

(a) Terrestrial fauna.

(b) Marine ecosystems:

- Light spill;
- Dredging;
- Underwater noise; and
- Marine pest species.

(c) Air quality.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

(a) The principle of conservation of biological diversity and ecological integrity;

(b) The precautionary principle;

(c) The principle of intergenerational equity; and

(d) The principle of waste minimisation.

3.1 Terrestrial fauna

Description

The Port B development proposal is within the Chichester subregion of the Pilbara bioregion. The proposal has a development footprint of 340 hectares (ha), within which up to 300 ha of vegetation will be cleared. A range of habitat units would be cleared including:

- primary dunes of scattered shrubs over mixed tussock grassland;
- secondary dunes of shrubland over hummock grassland; and
- flat coastal plain of scattered shrubs over hummock grassland.

Habitat condition varies with some areas affected by weeds and physical disturbance while others are in excellent condition. Clearing of vegetation has the potential to impact on habitat used by terrestrial fauna.

The proponent commissioned a two-phase fauna survey. A total of 120 vertebrate species were recorded with data indicating that over 150 may occur within the development area. The greatest variety of vertebrate species was recorded in the primary and secondary dune habitats.

Three Priority species listed under the *Wildlife Conservation Act 1950* were recorded in or near to the development area:

- Little northern freetail bat, (*Mormopterus loriae cobourgiana*) (Priority 1);
- Eastern curlew, (*Numenius madagascariensis*) (Priority 4); and
- Star finch, (*Neochmia ruficauda subclarescens*) (Priority 4).

A search of Western Australian and Commonwealth fauna databases identified an additional six species of conservation significance that potentially occur within the development area:

- Northern quoll, (*Dasyurus hallucatus*) (Schedule 1);
- Pilbara olive python, (*Liasis olivaceus barroni*) (Schedule 1);
- Peregrine falcon, (*Falco peregrinus*) (Schedule 4);
- Australian bustard, (*Ardeotis australis*) (Priority 4);
- Bush stone-curlew, (*Burhinus grallarius*) (Priority 4); and
- Flock bronzewing, (*Phaps histrionica*) (Priority 4).

Fauna surveys included techniques to target short range endemic (SRE) species. Three potential SRE mygalomorph spiders were found. Specimens have not been identified but do not correspond with species formally listed as specially protected. Information available on the frequency and distribution of the three spider species are summarised in Table 2.

Table 2 - Frequency and distribution of three mygalomorph spider species

Family	Genus and species code	Number of specimens	Number of sites	Habitat occurrence
Nemesiidae	Aname sp. A	19	10	Predominantly primary and secondary dunes but also found on flat coastal plain
Nemesiidae	Aname sp. B	3	2	Flat coastal plain
Idiopidae	Sp. A	1	1	Flat coastal plain

The fossorial skink *Lerista nevinae* is known only from the Cape Lambert area. Results from the two-phase fauna surveys, together with additional targeted surveys for this species, indicate that its mainland distribution is restricted to primary and secondary dune habitats between Popes Nose creek and Dixon Headland. This is an area of approximately 472 ha along about 18 km of coastline. *L. nevinae* is relatively common within its dune habitat accounting for 11.8% of herpetofauna (amphibian and reptile) individuals recorded during the two-phase fauna surveys. A total of 35 specimens have been recorded from 14 locations on the mainland and two individuals have been recorded at Dixon Island. *L. nevinae* is not expected to occur on other islands in the Dampier Archipelago.

L. nevinae is not currently assigned a conservation listing under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Wildlife Conservation Act 1950,* because of its recent formal description and lack of adequate survey data. However, its very restricted distribution within unprotected areas could result in its eligibility to be categorised as vulnerable under the International Union for Conservation of Nature (IUCN) criteria adopted for formal listing under the EPBC Act, and as a Schedule 1 species under the *Wildlife Conservation Act 1950.* More survey work would be required to confirm eligibility for these listings.

During construction, impacts on fauna would be managed through the implementation of fauna Environmental Management Procedures. The proponent has Wildlife Interaction Guidelines to manage operational impacts. The proponent has made the following commitments to manage terrestrial fauna:

- undertake additional targeted searches for *L. nevinae* outside the development area;
- minimise disturbance of primary and secondary dune habitats;
- actively manage to protect all *L. nevinae* habitat within the industrial lease that will not be cleared;
- raise staff awareness of fauna management issues during site inductions; and
- support reasonable initiatives to secure areas of known suitable coastal dune habitat for *L. nevinae* outside the Port B development area.

Submissions

Submissions relating to terrestrial fauna focused on:

- impacts on *L. nevinae* including impacts on its conservation status;
- a need for additional *L. nevinae* surveys;
- impacts on mygalomorph spiders; and
- uncertainties regarding the significance of mygalomorph spiders.

Assessment

The EPA's objectives for terrestrial fauna at Cape Lambert are:

- *to maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge; and*
- *to protect specially protected fauna and their habitats consistent with the provisions of the Wildlife Conservation Act 1950.*

The EPA notes that the skink species *L. nevinae* is of conservation significance and based on current knowledge, could be listed as vulnerable under the EPBC Act and be equivalent to a Schedule 1 species under the *Wildlife Conservation Act 1950*. The EPA also recognises that the restricted distribution of this species makes it vulnerable to loss of habitat.

The initial Port B development proposal outlined in the proponent's PER included the clearing of 34 ha, or 9% of mainland *L. nevinae* habitat. The EPA notes that Cape Lambert fauna survey reports published at that time indicated that while the loss of animals from other species would not be significant enough to affect their overall conservation status, "*the exception to this may be the fossorial skink Lerista nevinae*" (Biota, 2008b). The EPA also notes the advice of the Department of Environment and Conservation (DEC) that the removal of approximately 9% of *L. nevinae* habitat could potentially affect the conservation status of this species and that measures should be taken to protect remaining *L. nevinae* habitat if the proposal was to be implemented.

Further studies since publication of the PER, have resulted in the identification of additional areas of *L. nevinae* habitat. The proponent has also redesigned the proposal to reduce direct impacts on *L. nevinae* habitat to a maximum area of 19.2 ha. As a consequence, direct impacts from clearing have been reduced from 9% to 4.1% of its known mainland distribution.

The EPA is aware that none of the *L. nevinae* habitat is reserved for conservation. However, the EPA also notes the following:

- of the 89.5 ha of *L. nevinae* habitat that occurs within the proponent's lease, 70.3 ha will remain intact;
- the proponent has committed to implement management regimes to protect *L. nevinae* habitat within this industrial lease;
- some protection of 21.5 ha of *L. nevinae* habitat will be afforded in a Shire vested recreation reserve that runs along the coastal strip adjacent to much of the Port B development;
- in addition to the known mainland population, *L. nevinae* has been located on Dixon Island;
- the proponent is supportive of an initiative to establish a buffer zone between the town of Point Samson and the industrial operations at Cape Lambert. A change in the reservation purpose of this area from Industrial to Conservation would see the protection of 41.5 ha of *L. nevinae* habitat that although disconnected or fragmented from the rest of the mainland population, would contribute significantly to the protection of that component of the population; and
- the continuing viability of *L. nevinae* when restricted to 41.5 ha demonstrates its apparent capacity to persist in small, isolated and disjunct populations.

In addition to direct clearing, there is the potential for indirect impacts on *L. nevinae* habitat from dust, noise and vibration, altered hydrology and fire regimes, and increased populations of weeds and feral animals. Information provided by the proponent indicates that direct effects of mineral dust on vegetation become apparent at surface loads greater than 7 grams per square metre (g/m^2). Dust modelling indicates that the 7 g/m^2 isopleth extends a short distance beyond the development footprint and the proposal boundary abuts over 3.5 km of *L. nevinae* habitat. The EPA considers the potential impacts from altered hydrology, fire, and introduced species of weeds and feral animals to be manageable.

Taking account of the points raised above, the EPA holds the view that with the implementation of effective management over the remaining *L. nevinae* habitat within the Port B industrial lease, the clearing of 19.2 ha of *L. nevinae* habitat for the construction of essential infrastructure is unlikely to change the conservation status of *L. nevinae*.

The EPA also considers it unlikely that the Port B development would change the conservation status of the Priority Species listed under the *Wildlife Conservation Act 1950* that have either been recorded, or have the potential to occur at Cape Lambert:

- The Little northern freetail bat, (*Mormopterus loriae cobourgiana*) and Eastern curlew, (*Numenius madagascariensis*) occur primarily in mangrove and mud flat habitats. Port B would have only minimal impact on these habitats.
- The Star finch, (*Neochmia ruficauda subclarescens*) would experience some loss of habitat, but this species is known to wander widely and the lost habitat would not be considered significant over their entire range.
- The Northern quoll, (*Dasyurus hallucatus*) and Pilbara olive python, (*Liasis olivaceus barroni*) may occur sporadically but the development area does not include core habitat for these two species.
- Peregrine falcons, (*Falco peregrinus*) have large home ranges that may extend over the Cape Lambert area periodically. Vegetation clearing would result in some reduction in foraging habitat but this loss is not considered significant over their entire range.
- The Australian bustard, (*Ardeotis australis*) and Bush stone-curlew, (*Burhinus grallarius*) range widely and the bustard is probably nomadic. The loss of habitat proposed at Cape Lambert is considered small scale in relation to their range.
- The Flock bronzewing, (*Phaps histrionica*) is probably nomadic and while it may occur in the development area, the loss of habitat is considered small scale in relation to the range of this species.

Of the three potential SRE mygalomorph spiders, *Aname sp. B* and *Idiopidae sp. A* were located only within the development footprint. However, the flat coastal plain habitat in which they were recorded is widespread and well represented outside the development footprint. *Aname sp. A* was located inside and outside the development footprint on both dune and flat coastal plain habitats. The EPA therefore considers it likely that all three mygalomorph spider species recorded within the development footprint, are sufficiently widespread to ensure that the Port B development would not significantly impact their populations.

Summary

The EPA notes that the:

- loss of 4.1% of the mainland habitat of the conservation significant skink species *L. nevinae* is unlikely to alter its conservation status;
- habitats of potential short range endemic mygalomorph spiders are widespread outside the development footprint and these species are therefore unlikely to be significantly impacted by the proposed loss of habitat;
- area proposed for clearing does not represent core habitat for any fauna species listed under the EPBC Act or the *Wildlife Conservation Act 1950* as potentially occurring at Cape Lambert, and is therefore unlikely to alter their conservation status.

The EPA therefore considers that, with a careful approach and the implementation of Condition 5, which limits the amount of *L nevinae* habitat cleared to 4.1% and requires management of the Port B proposal to ensure habitat values in the areas retained are not impacted by development and ongoing operations, the proposal can be managed to meet the EPA's objectives.

3.2 Marine ecosystems

Description

The area considered during assessment of the Port B proposal included benthic primary producer habitats and humpback whale activities within 28 km of Cape Lambert. The assessment of impacts on turtles focused on the location of the proposed new jetty and on mainland rookery beaches at Cape Lambert.

Cape Lambert is located in the warm waters of the Pilbara Near-shore Bioregion. The area surrounding Cape Lambert has a broad shallow seafloor of hard pavements and soft sediments that shift in the strong tidal currents and regular cyclonic storms. There are several exposed reefs and islands, with true fringing coral reefs in the clearer offshore waters. The area is characterised by a high diversity of marine life.

Cape Lambert is located within the gazetted port of Port Walcott. Port Walcott extends west from the Sherlock River to the Burrup Peninsula and encompasses both Western Australian and Commonwealth waters. Negotiations are currently in progress to adjust Port Walcott boundaries to allow for the declaration of Dampier Archipelago Marine Park along the mainland coast of Nickol Bay and at Delambre Island.

The Pilbara Coastal Waters study (DoE, 2006) has interim approval by the EPA. It defines environmental quality objectives for areas zoned for Maximum, High, Moderate or Low Level of Ecological Protection (LEP). Existing facilities at Port A are within a zone of Moderate LEP. The proposed Port B jetty and wharves are located in a High LEP zone.

<u>Benthic primary producer habitats (BPPHs)</u>

Both soft and hard substrates support benthic communities. Closed canopy arid zone mangrove communities occur in sheltered coastal areas and two small stands of just a few stunted mangrove trees occur at Cape Lambert. Sea grasses are generally sparse

and the lack of well developed sea grass meadows means that soft substrate communities are unlikely to play a major role in primary production.

Three benthic primary producer communities occur on hard substrates; macro algae, turf algae and hard corals. These communities form a dynamic mosaic reflecting subtle differences in microhabitat and the recent history of disturbance. Hard substrates in the less turbid offshore waters support a higher diversity of coral species and generally have higher coral cover. Many coral species successfully persist in the more turbid near-shore waters but generally don't form reef assemblages. Turf algae cover more hard substrate than the other primary producers and are expected to provide one of the main sources of primary production.

Turtles

At least four species of marine turtle nest in the greater Cape Lambert region, and another two species are present as either migratory or foraging species. Of the four species known to nest in the region, three; flatbacks *Natator depressus*, greens *Chelonia mydas;* and hawksbills *Eretmochelys imbricate*, nest on beaches that are adjacent to the proposed Cape Lambert Port B development. These three species are listed in Schedule 1 of the *Wildlife Conservation Act* 1950 as species that are rare or likely to become extinct. They are also listed as vulnerable under the EPBC Act.

There are two turtle rookery beaches adjacent to the proposed development. These are Cooling Water Beach, which is surrounded by Port A operations and is already subject to direct light from adjacent plant and equipment, and Bell's Beach, where currently the only artificial light sources are distant sky glow and limited direct light from port infrastructure about 2.5 km away. The Port B proposal includes illuminated infrastructure within 150 metres of turtle nest sites at Bells Beach.

Turtle nesting is seasonal. Following mating during September and October, nesting begins in October and continues through to February. Hatchlings start to appear in December with the peak of emergence during January and February. Based on limited surveys, it is estimated that on average, 90 to 100 flatbacks nest on Bell's Beach, and 10 to 15 flatbacks nest on Cooling Water Beach each year. Much smaller numbers of green and hawksbill turtles nest on these beaches.

The behaviour of both adult and hatchling turtles is influenced by the intensity, wavelength and direction of light. The illumination of nesting beaches from inland light sources has the potential to stop females from accessing beaches to nest and preventing their return to the ocean after nesting. Inland light also attracts hatchlings away from the ocean. Turtles that are attracted inland are exposed to terrestrial predators and suffer exhaustion, overheating, dehydration and starvation.

Marine turtles have a heightened sensitivity to light at the high frequency, or blue and violet end of the spectrum. Fluorescent, mercury vapour and metal halide lights emit a large component of blue light and influence hatchling behaviour at significantly lower intensities than sodium vapour lights that emit more long wavelength or orange light.

Artificial lights have the greatest influence on turtle behaviour during darker phases of the lunar cycle. Moonlight lights up the entire sky and diminishes the relative brightness of artificial lights. The influence of light is also affected by atmospheric

conditions and weather. A high particulate content from for example dust, salt spray and humidity causes light to scatter resulting in sky glow. Cloud both blocks out moonlight and provides a reflective surface, again causing sky glow.

The proponent has prepared a turtle management plan to ensure that light spill poses no significant threat to turtles.

Mammals

A total of 13 marine mammal species listed under the EPBC Act are likely to occur within the waters surrounding the Port B development. Of these, the blue (*Balaenoptera musculus*) and humpback (*Megapera novaeangliae*) whales are also listed as rare or likely to become extinct under the *Wildlife Conservation Act 1950*.

A humpback whale migration route has been identified approximately 28 km north of Cape Lambert. However, advice from the Centre for Whale Research states that the whale migration route is 50 km wide (Jenner, 2001) and that animals come close inshore at Cape Lambert and often linger for lengthy periods in Nickol Bay.

Underwater noise

Dredging, blasting and pile driving would be the major sources of noise during construction. The focus of underwater noise in this report is the intensive noise associated with proposed pile driving operations.

Port B includes a new 2.1 km access jetty and wharves. Construction would involve the use of large impact hammers to drive in steel piles up to 1.6 metres in diameter. It is expected to take between three to ten hours to drive each pile using impacts at approximately one second intervals. The use of up to three piling barges would be used concurrently. Pile driving operations are expected to take twelve months.

Marine wildlife use sound and hearing to detect predators and prey and to communicate with each other. Noise impacts on marine wildlife include:

- physical injury and death;
- threshold shift hearing loss;
- behavioural changes; and
- masking of wildlife communication.

Fish deaths as a result of pile driving have been documented (Abbott and Bing-Sawyer, 2002; Caltrans, 2004; Hastings, and Popper, 2005).

Noise modelling was commissioned by the proponent to assess noise emissions and their likely impacts on turtles, fish and humpback whales. Threshold noise levels predicted to cause injury and avoidance in each animal group were estimated based on the limited and inconclusive scientific literature. The model was run for piling near the shore, half way along the jetty and in the deeper waters near the end of the jetty, to account for noise travelling further in deep water. Two scenarios were investigated, noise emissions from hammering a single pile, and noise emissions from simultaneously hammering three piles.

Modelled injury zones around single piles being driven alone were estimated to have a radius of:

- 140 to 340 metres for fish
- 20 to 30 metres for adult turtles; and
- 40 to 70 metres for hatchling turtles and humpback whales.

Injury zones predicted for the worst-case scenario of three concurrently operating pile drivers were predicted to have a radius of:

- 250 to 630 metres for fish;
- 40 to 65 metres for adult turtles; and
- 80 to 125 metres for hatchling turtles and humpback whales (SVT, 2009).

Avoidance zones were not estimated for hatchling turtles and fish. Based on modelled emissions from a single pile, an avoidance zone of 300 to 400 metres was predicted for adult turtles and up to eight km for humpback whales. For the worst-case scenario of three concurrent piling operations, the predicted avoidance zone for adult turtles had a radius of approximately 550 to 800 metres and for humpback whales, the predicted radius was up to ten km in the northerly and easterly directions.

The proponent has prepared Marine Turtle and Cetacean management plans in which commitments are made to implement reactive management protocols to ensure that noise impacts do not pose an unacceptable risk to marine wildlife, in particular whales and turtles. These plans address:

- the deployment of a Marine Fauna Observer to watch for sensitive marine wildlife;
- implementing a soft start procedure to gradually increase noise levels as a warning and to encourage wildlife to leave the area;
- restricting pile driving operations to daylight hours during the turtle nesting season;
- implementing a staged approach to construction to avoid piling at inshore locations adjacent to the turtle nesting rookery at Cooling Water Beach during the peak nesting season; and
- suspending piling if sensitive wildlife come within 100m of piling operations.

Dredging

Dredging is required to construct new berth pockets, a turning area, a departure area and channel, and an extension to the tugboat harbour. The proposed dredging program involves the removal of 14 Mm^3 of material from an area of 320 ha. Dredged material would be disposed of in three existing dredge spoil grounds. Two of these spoil grounds are beyond the Western Australian State territorial boundaries in Commonwealth waters. The third spoil ground, covering an area of approximately 1 km by 2 km, is located just within State waters to the north of the proposed Port B development.

The proponent anticipates that all seabed material can be removed using dredging equipment. However, there remains the potential that some areas would require the use of explosives. Blasting has the potential to impact marine biota causing death or injury.

Dredging and the disposal of dredge material will cause irreversible loss of BPPH through direct seabed disturbance and habitat removal. In addition, indirect, or reversible impacts to marine biota are caused by increased levels of suspended

material in the water column (turbidity) and sedimentation. Turbidity reduces the availability of light for photosynthesis, while an increase in sedimentation can abrade and smother sensitive organisms.

Hard corals are generally considered more sensitive to increased levels of turbidity and sedimentation than other hard substrate benthic primary producers. Impacts vary in relation to coral colony size, growth-form depth and sediment type. Turbidity and sedimentation also have the potential to impact coral reproduction, larval settlement and the survival of juvenile corals.

Port B infrastructure has been designed to minimise the direct loss of BPPHs. However, the following direct losses are anticipated:

- 0.4 ha of intertidal BPPH located where the new access jetty comes ashore near to Cooling Water Beach; and
- 0.3 ha of mangrove habitat consisting of a small clump of less than 15 trees at the western end of Cooling Water Beach.

To estimate the extent of indirect, or reversible impacts from elevated levels of turbidity and sedimentation, the proponent used predictive models to simulate weather conditions, currents, waves and sediment movement. An independent peer review of Port B modelling was carried out.

Using hard corals to determine benthic primary producer thresholds, the proponent modelled zones of influence and impact caused by elevated levels of turbidity and sedimentation (figure 3). Zones of influence denote areas predicted to experience anomalous turbidity and sedimentation levels at some stage during the dredging program, but at levels below those likely to cause an impact. Dredge modelling predicts that a maximum area of 19,211 ha of BPPH could be influenced by elevated turbidity and/or sedimentation levels. Zones of impact denote areas where some coral mortality is likely. Dredge modelling predicts that a maximum area of 69.5 ha of BPPH could be impacted by elevated turbidity and/or sedimentation levels. BPPHs most likely to be impacted by dredging activities are located along the mainland coast and to the southeast of Bezout Island. No impacts to BPPHs are predicted adjacent to spoil disposal grounds or within the proposed Dampier Archipelago Marine Park.

The proponent has prepared a draft Dredge and Spoil Disposal Management Plan (DSDMP) to ensure that dredging operations do not pose a significant risk to marine ecosystems. The DSDMP addresses the following:

- baseline monitoring of water quality and benthic primary producer habitats prior to dredging;
- water quality and coral health monitoring;
- BPPH loss targets and the implementation of a reactive management programme based on net coral mortality trigger levels;
- the suspension of dredging operations during mass coral spawning periods;
- monitoring to test modelled BPPH loss predictions; and
- the investigation of coral and other BPPH sensitivities to elevated levels of turbidity and sedimentation.

Marine pests

Non-indigenous marine pests can cause significant impacts to natural communities, fisheries and aquaculture industries. Potential sources of pests species introduction associated with the Port B development are:

- vessels and equipment for dredging, piling and other construction activities; and
- iron ore bulk carriers.

Shipping can introduce non-indigenous marine pests in two ways;

- in water and sediments transported as ballast; and
- through the settlement of fouling organisms on ships' hulls and equipment.

The Australian Quarantine and Inspection Service (AQIS) administers the *Quarantine Act 1908* requiring all vessels from overseas to exchange ballast water outside Australia's territorial limit (12 nautical miles). AQIS officers board vessels coming from overseas and inspect ships' records relating to ballast exchange. It is well documented that no ballast exchange technique replaces all water within ballast tanks. International efforts are therefore focusing on the development and implementation of ballast water treatments that will sterilise ballast water.

It is estimated that 85 per cent of non-indigenous marine organisms in tropical areas have been introduced through bio-fouling. The national guidance *Biofouling Management Guidance for Non-trading Vessels* 2009 sets out best practice maintenance for dredges, barges and tugs to minimise the risk of pest species introductions. In addition, AQIS is preparing to implement Australia's Biofouling Management Requirements that will empower officers to inspect the hull of any vessel entering Australian waters.

The Department of Fisheries (DoF) is the lead agency for managing risks associated with non-indigenous marine pests in Western Australia. The DoF has developed an emergency/incident response plan should any pest species be introduced into Western Australia.

A national invasive species monitoring network is coordinated by the Commonwealth Department of Fisheries and Forestry (DAFF). Standard survey techniques focus on determining the presence or absence of target pest species. The proponent commissioned an introduced marine pest survey of the Cape Lambert area in 2006 using the national surveys standards. Results provided no evidence of the establishment of any of the targeted marine pests at or near to Cape Lambert.

The proponent has developed a DSDMP to manage and minimise the risk of introducing marine species via dredging equipment. The proponent has also developed a Marine Environmental Water Quality Management Plan that describes monitoring and management measures to manage marine pests. These include:

- monitoring target areas at Cape Lambert at least every three years;
- notifying DoF and DEC of any detected pest incursions and both developing and implementing invasive species control plans if required;
- implementing a dredging vessel inspection and clearance procedure; and
- implementing invasive marine species responses if pests are identified on dredging vessels.

Submissions

- Impact of light spill on turtles.
- Coastal processes.
- Underwater noise submissions focused on the impacts of piling on marine wildlife, in particular whales and turtles.
- Concerns regarding impacts of dredging on marine ecosystems.

Assessment

The EPA's objectives for this factor are to:

- *Protect specially protected fauna and their habitats consistent with the provisions of the Wildlife Conservation Act 1950;*
- *Maintain the ecological function, abundance, productivity, geographic distribution and biodiversity of intertidal and subtidal species;*
- *Minimise the risk of introduction of non-indigenous marine organisms.*

Light spill impacts on turtles

Monitoring from a selection of other rookery beaches within the same region confirm that Cape Lambert beaches provide nesting habitat for less than 10% of nesting female flatbacks. At a broader scale encompassing the whole north west shelf flatback population of between 6500 and 10000 females, the number of nesting flatback females using Cape Lambert beaches represent approximately 1 to 1.5% of the population.

The flatback rookery at Cape Lambert is the focus of considerable local community interest. Local members of the community have recorded nesting activity for several years and submissions demonstrate a level of community concern regarding the long term welfare of the adult females and hatchlings that use these beaches.

The sex of hatchling turtles is determined by egg temperatures during incubation. DEC had raised concerns regarding the potential for the darker, less reflective sands on mainland beaches providing important female recruitment to turtle populations. To address DEC's concerns, the proponent commissioned a preliminary monitoring survey of incubation temperatures at Cape Lambert and nearby island beaches. The results support the expectation that recruitment from mainland beaches is likely to be biased towards females, but also indicates that hatchlings of both sexes are recruited from the pale coloured and cooler island rookeries. The EPA considers it very unlikely that, in a regional context, female recruitment from mainland Cape Lambert beaches is important for maintaining sex ratios in North-West Shelf turtle populations.

The EPA notes that during a recent turtle survey (Biota, 2009), 4 of the 40 tagged female flatbacks nesting at Bell's Beach had also been recorded at other beaches:

- Cleaverville Beach on the mainland during the previous season;
- Delambre Island during the previous season;
- Boat Beach, adjacent to Bell's Beach, during the same season; and
- Munda Beach, 100 km to the east, during the same season.

These animals demonstrate that female flatbacks move both within and between nesting seasons and that there is some interchange between mainland and island beaches. The

EPA therefore considers it likely that females deterred from nesting at Cape Lambert by elevated light levels may nest elsewhere.

Continued nesting on Cooling Water Beach which is already illuminated by Port A, demonstrates that some females would not be deterred from coming ashore and nesting. The proponent has not monitored the success of hatchlings emerging from these nests, but studies elsewhere have shown that the success of hatchlings leaving illuminated beaches is significantly lower than their success from dark beaches (Harewood and Horricks, 2007).

The proponent has measured and modelled light levels at Cape Lambert. However, the EPA considers there to be high levels of uncertainty associated with measuring, modelling and interpreting light levels to the extent that it is not possible to confidently map a zone of light influence at Cape Lambert beaches. The EPA notes that artificial lights have influenced turtle behavior both on land and in the water over distances of many hundreds of metres from individual lights (Limpus, 2008 and Pendoley, 2005) and over several kilometres from more intensive light sources (Limpus, 2008).

The EPA is aware that the proponent has contributed to turtle monitoring and research and is committed to continue building on this body of knowledge. The EPA is of the view that light spill from the development still has the potential to impact turtle activity on Bell's Beach. However, with the implementation of all monitoring, research, design and management initiatives outlined in the Turtle Management Plan, the EPA would expect an improvement in understanding and refinements in design and operations that would result in a significant reduction to potential impacts from light spill.

In view of the small size of the local nesting turtle population, the proponent's commitment to manage light spill through a programme of continuous improvement and with the implementation of Condition 6 that relates to turtle management, the EPA considers that light spill can be managed to meet its objectives.

Underwater noise

The EPA is aware of uncertainties associated with the estimation of potential noise impacts on marine wildlife at Cape Lambert. Uncertainties relate both to the model itself and to the thresholds used for determining injury and avoidance in the different types of animal. The EPA holds the view that the proponent should provide support for experts to use the Port B piling operation to compare modelled with actual measured noise emissions to advance our predictive capacity in this area.

The proponent has described the model as having an average accuracy of 12 decibels (dB). Because the dB scale is logarithmic, a 6dB increase is equivalent to a doubling of noise levels. Noise level predictions with a 12dB error margin can therefore only be considered indicative. In addition, estimates of noise emissions are based on single hammer strikes which take no account of the likely compounding impact of repetitive strikes.

The proponent has made reference to a range of publications when selecting threshold values for injury and avoidance. The EPA does not agree in all respects with the way in which the proponent has applied guidelines and the results of other studies in determining these thresholds. However, the EPA is of the view that, with so little

scientific knowledge in this area, the thresholds used in the modelling provide a reasonable, though not necessarily precautionary, basis for estimating impacts on marine wildlife at Cape Lambert.

The EPA recognises that hatchling turtles and site attached fish would be unlikely to move away from pile driving operations. The EPA supports the proponent's commitment to stop pile driving at night during the turtle nesting season to limit hatchling losses. However, the EPA considers that if night time stoppages are to be effective in minimising hatchling injury and death, all lighting on pile driving barges and other equipment located anywhere near to the areas where pile driving is planned during the following day, would need to be switched off.

It is anticipated that adult turtles, whales and non-site attached fish would tend to avoid areas where there are dangerous noise emissions. The EPA notes that predicted zones of avoidance for adult turtles have the potential to encompass the approach to Cooling Water Beach turtle rookery. To minimise impacts during the turtle nesting season, the proponent has committed to both stop pile driving at night when females come ashore and to avoid driving inshore piles during this time. With the implementation of these management commitments, the EPA is satisfied that the proposed pile driving operations do not present an unacceptable risk of disrupting turtle nesting at Cooling Water Beach.

The EPA supports the proponent's commitment to employ a Marine Fauna Observer to both ensure that sensitive wildlife is outside a 500 metre exclusion zone prior to commencing piling operations and to suspend piling operations should sensitive wildlife move within a 100 metre radius of piling operations. However, the EPA notes that, other than during the turtle nesting season, the proponent intends to undertake pile driving at night when monitoring the exclusion zones would not be possible. The DEC advised that night time pile driving should be suspended during both the turtle nesting and peak whale migration seasons. The EPA recognises the effectiveness of soft start procedures in warning wildlife to move away from the area. However, it is of the view that the likely presence of humpback whale calves adds an additional risk to night time pile driving during the southern migration of cow/calf pods. The EPA therefore considers that pile driving at night during the peak period of the southern humpback whale migration should not be undertaken. Based on the modelled injury zone for humpback whales having a radius greater than 100 metres, the EPA also considers it appropriate to extend the injury buffer to 150 metres when more than one pile is being driven concurrently.

Humpback whales use complex vocalisations and it is possible that communication between mothers and their calves helps to keep them close together. The Center for Whale Research advised that the potential for masking and behavioural change associated with proposed pile driving at Cape Lambert is likely to be a significant issue for humpback whales. Piling would be clearly audible at a distance of 28 km, the distance reported to represent the centre of the whale migration route. However, limitations associated with both the noise propagation model and the lack of understanding relating to whale communication do not allow a rigorous assessment of potential communication masking.

The EPA notes that the proposed pile driving program is limited to a single migration season. With the implementation of Condition 7 which provides that pile driving does not occur during the peak migration period, it is the EPA's view that the potential for mother/calf separation due to communication masking does not present an unacceptable risk to the population of migrating humpback whales.

Dredging

In accordance with EPA Environmental Assessment Guideline No.3 (EAG3), *Protection of Benthic Primary Producer Habitats In Western Australia's Marine Environment* (EPA, 2009), the proponent has defined local assessment units to provide a framework for assessing losses of BPPHs. The six local assessment units were defined based on ecological attributes and on the proposed Dampier Archipelago Marine Park boundaries (figure 3).

The EPA notes that the proponent has amalgamated all hard substrate benthic primary producer communities into a single category that they refer to as BPPH mosaic. Based on the combined occurrence and dynamic nature of BPPHs at Cape Lambert, the EPA considers that for the purpose of estimating BPPH losses at this site, the amalgamation of hard coral, patchy seagrass, and both turf and macro algae into a single BPPH mosaic category is appropriate. This approach is site specific and may not be appropriate as a general rule.

Cumulative irreversible losses resulting from the construction of both Port A and Port B, were predicted to be less than 1% of BPPH mosaics in all management units. This is well below the guidelines for loss thresholds presented in EPA EAG3.

The EPA accepts that after completion of the Port B dredging program, benthic communities impacted by elevated levels of turbidity and/or sedimentation are likely to recover. The EPA therefore holds the view that these impacts are appropriately considered reversible. The level of reversible impacts did not exceed 10% of BPPHs in any of the local assessment units.

Although the results of dredge plume modelling and estimates of BPPH impacts are presented as mapped zones and percentage areas, the monitoring and management of dredging operations are based on data from discrete survey sites. The capacity of the dredge monitoring and management program to constrain on-site impacts to those predicted by dredge plume modelling is influenced by the:

- distribution of survey sites in relation to the predicted zone of impact; and
- maximum levels of impact, or limits, set for each site.

The draft DSDMP describes 15 survey sites. The 5 sites closest to the outer boundary of the worst case dredge plume impact zone are referred to as 'indicator' sites. Some indicator sites are 2 km outside the worst case dredge plume impact zone and at Bezout Island there are significant areas of BPPH mosaic within the intervening 2 km. To ensure that impacts are constrained to levels that approximate those predicted by plume modelling, the EPA is of the view that an additional indicator site should be established as close as practicable to the worst case dredge plume impact zone on the eastern side of BPPHs at Bezout Island. Surveys at this additional site should be used to demonstrate that data from other indicator sites at Bezout Rock, Bezout Island and Bell's Rock are indicative of impacts closer to the predicted impact zone.

The proponent proposes to implement management actions based on progressive trigger levels of up to ten percent coral morality at indicator sites. The EPA notes that dredge plume modelling predicts there would be no impacts at indicator sites, most of which are some distance, (up to 2 km) beyond the predicted impact zone. The EPA therefore considers the use of trigger levels of up to 10% coral mortality to be unjustifiably high and not to reflect the predicted dredge plume or BPPH losses considered above in accordance with EAG3. Using the rapid monitoring techniques proposed, the minimum detectable change is 3% to 5% coral mortality. The EPA therefore considers that the DSDMP monitoring and management program should ensure that there is no more than 5% coral mortality at indicator sites.

The EPA is supportive of the use of real-time monitoring as a method of validating water quality modelling, however acknowledges that in this instance the existing proponent's proposed monitoring schedule is at such a frequency that real time monitoring is unlikely to add any additional value to the DSDMP.

Based on the view that BPPH losses from dredge plume turbidity and sedimentation will recover and with the implementation of Condition 8, which limits the area of BPPH to be lost, it is the EPA's view that proposed dredging operations for the construction of Port B would not result in significant long-term impacts on BPPHs.

Drilling and blasting produce significant noise and vibration that have the potential to impact marine fauna within the immediate vicinity of operations. Geotechnical investigations indicate a low risk that drilling and blasting would be required. The use of a large, powerful cutter suction dredge would also reduce the likely need for blasting. However, the EPA recognises that some pre-treatment drilling and blasting may be necessary and holds the view that if required, the proponent should prepare for review a more detailed drilling and blasting management plan to ensure potential impacts and management are properly considered in the event that drilling is required. This is addressed in Condition 11.

Ongoing port activities, in particular sediment disturbance by ships' propellers would impact water quality at Port B. With reference to the Department of Environment draft Pilbara Coastal Waters Quality document (DoE, 2006), the proponent has therefore proposed the rezoning of an area from "high" to a "moderate" level of protection. The rezoned area would include the whole Port B berth pocket and Service Wharf B to a distance of approximately 400m on either side of the berths (figure 2). The EPA is in agreement with this proposed rezoning.

Marine pests

Construction vessels and equipment used for dredging and pile driving pose a significant risk of introducing pest species to Cape Lambert if they are not appropriately managed.

The EPA notes the proponent's commitment to assess, inspect and treat vessels and equipment used for dredging in a manner consistent with best management practice. The EPA however, considers that these management procedures should also be applied to the vessels and equipment required for pile driving and other construction activities.

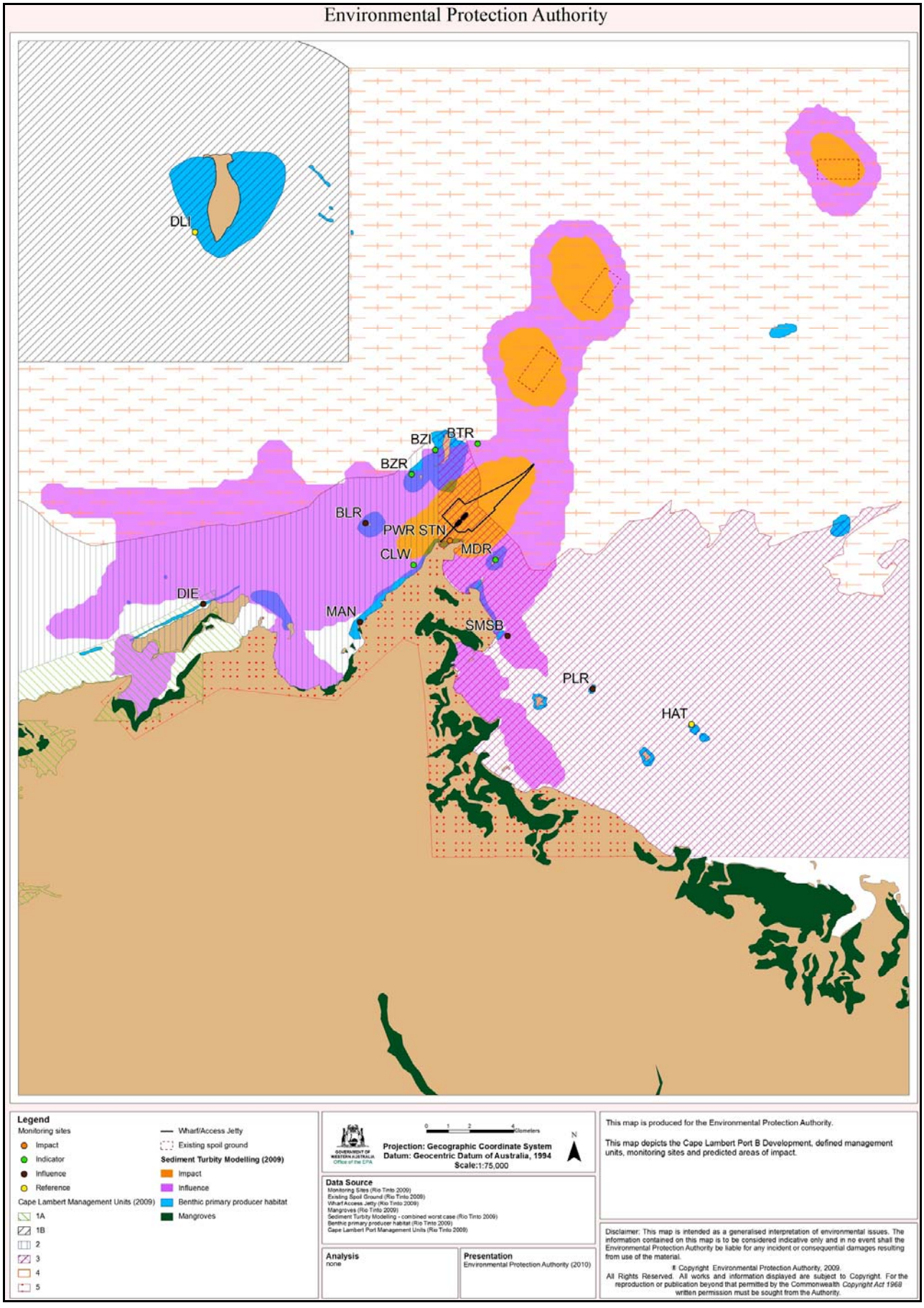

Figure 3: Predicted dredge plume impacts and proposed monitoring sites

The EPA considers that risks associated with introducing marine pests at Port B would be no greater than risks associated with other ports in the Pilbara and that the proposal can be managed to meet the EPA's environmental objectives with the implementation of Condition 9.

Summary of marine ecosystems

Having particular regard to the:

- small size of the local nesting turtle population and the proponent's commitment to manage light spill through a programme of continuous improvement;
- low levels of predicted permanent loss of benthic primary producer habitats;
- implementation of a pile driving management framework that includes soft starts, exclusion zones and associated reactive management actions plus the seasonal cessation of night time pile driving; and
- proponent's commitment to implement vessel clearance procedures,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for this factor provided that Conditions 6,7,8,9 and 11 that relate to turtle management, pile-driving, dredging and introduced marine pests and drilling and blasting implemented.

3.3 Dust

Description

The existing Cape Lambert Port A has an approved capacity of up to 85 Mtpa of iron ore, and is approximately 4 km north-west of Point Samson, and approximately 9 km north of Wickham (Figure 1). Under certain conditions, Port A is known to contribute to elevated PM_{10} dust concentrations at Point Samson, and associated exceedances of the National Environment Protection Measure (NEPM) standard.

The proposed Cape Lambert Port B would significantly expand the existing Cape Lambert Port operations. The total amount of iron ore that could be handled would increase up to 215 Mtpa. The new Port B stockpile area would also be directly west of Point Samson (in line with the predominant westerly winds), and would be about 4km north of Wickham.

Port B has the potential to significantly increase dust emissions from the Cape Lambert operation via the additional:

- iron ore stockpiles;
- rail car dumpers;
- conveyors;
- transfer points;
- stackers;
- reclaimers;
- screen houses; and
- ship loaders.

Impacts on the nearby sensitive receptors of Point Samson and Wickham would also increase due to the proposed location of the new Port B stockpiles and ore handling facilities being:

- predominantly upwind of Point Samson; and
- closer to Wickham.

The proponent plans to install dust control measures on the Port B facilities, plus retrofit some additional dust controls on the existing Port A infrastructure, in order to minimise the total dust emitted.

Since release of the PER, the proponent has provided revised information on dust impacts (SKM, 2009d). The changes arise from the shortening of the jetty by 576 metres, the addition of background dust levels and the inclusion of 2008 monitoring data. The updated summary of modelled results is included below in Table 4. The revised maximum ground level concentrations (GLCs) predicted at Point Samson and Wickham are considerably higher than those presented in the PER.

Table 3 - Updated summary of modelled dust levels

Pollutant	Scenario	Averaging period	Maximum at Point Samson (NEPM)	Percentage of criteria	Maximum at Wickham	Percentage of criteria (NEPM)
PM_{10}	Port A	24-hour	37 μg m^{-3}	74	29 μg m^{-3}	58
	Port A+B	24-hour	40 μg m^{-3}	80	30 μg m^{-3}	60
$PM_{2.5}$	Port A	24-hour	10.9 μg m^{-3}	44	9.6 μg m^{-3}	38
	Port A+B	24-hour	11.4 μg m^{-3}	46	9.8 μg m^{-3}	39
TSP	Port A	24-hour	49 μg m^{-3}	54 (Standard)	36 μg m^{-3}	40 (Standard)
				33 (Limit)		24 (Limit)
	Port A+B	24-hour	53 μg m^{-3}	59	38 μg m^{-3}	42
				35		25
Deposition	Port A	Monthly	0.9 g m^{-2}	23	0.02 g m^{-2}	1
	Port A+B	Monthly	1.1 g m^{-2}	28	0.04 g m^{-2}	1

The Ministerial Statement for Port A (Statement No. 741) requires the proponent to have in place a Dust Management Plan (DMP). The current version of this DMP was valid until the 2009 calendar year (Rio Tinto, 2008). The proponent intends to manage dust emissions from the combined Port A and Port B operation through a revision of the existing DMP.

Statement 741 requires monitoring and reporting when port operations significantly contribute to dust impacts at Point Samson. This is based on an "arc of influence" of wind direction from 290 – 20 degrees (i.e. upwind of Point Samson). The addition of Port B means that this "arc of influence" will need to be expanded.

The proponent also intends to use two additional real time dust monitors to improve the management of dust.

Submissions

Submissions related mainly to the validity of the modelling, the omission of background levels in the results, the need for the DMP to be updated, and the method for determining when the port is significantly contributing to dust impacts.

Assessment

The areas considered for the assessment of this factor are the town of Point Samson and the town of Wickham.

The EPA's environmental objectives for this factor are to ensure:

- *that dust emissions do not adversely affect the health, welfare and amenity of people in the nearby towns; and*
- *that dust emissions are reduced as far as practicable.*

The EPA previously noted the dissatisfaction of the Point Samson community over the dust levels at Point Samson in Report 1246 (EPA, 2007), and is aware that dust remains a concern for the community.

The EPA considers that the revised predictions of dust concentrations (which now include background levels) represent a much better picture of the dust impacts experienced by the community.

The EPA notes that the revised modelling (for the combined Port A and B operation) predicts only a minor increase (around 5%) in the GLCs of dust at Point Samson and Wickham when compared with the approved Port A operation. The DEC advised that the proponent is proposing best available technology for dust minimisation, and the EPA accepts that the modelled predictions are reasonable given the dust mitigation measures incorporated into the Port B design, and the improvements proposed for Port A.

The EPA also considers that the additional real time dust monitors (between Port B and Point Samson) should provide early warning of high dust levels and facilitate better proactive management of dust prior to impacts on the community occurring.

The maximum GLC of PM_{10} predicted at Point Samson represents 80% of the NEPM, and this remains a concern for the EPA. The EPA considers it essential that the dust mitigation measures proposed are implemented, and that they meet or exceed expected performance. The DEC advised that these dust mitigation measures can be assessed during the Works Approval process under Part V of the *Environmental Protection Act 1986.*

The DEC also intends to review the existing Part V Licence to ensure the implementation of a comprehensive set of conditions relating to dust management. Recently, Licence conditions applied to ports throughout Western Australia have been investigated following the Esperance lead issue, and future port licences will incorporate the improvements identified through this review process.

The DEC has advised that new Licence conditions applied to the Cape Lambert Port operation will include monitoring against set targets, reporting of exceedances, and improvement processes to be implemented when exceedances become apparent. The EPA notes this advice, and agrees that requirements for the ongoing monitoring, reporting and regulation of dust emissions are best handled through the operating Licence issued under Part V of the *Environmental Protection Act 1986.*

The EPA notes that the existing DMP will require substantial revision to incorporate the Port B operations. Particular attention needs to be given to specifying the "arc of influence" for wind direction that impacts on Point Samson and Wickham, and defining an appropriate criterion to determine when the port operations significantly contribute to dust levels at both Point Samson and Wickham. The EPA notes that defining this criterion is likely to involve some iteration and it is therefore best addressed under Part V of the *Environmental Protection Act 1986*. As such, the EPA has recommended Condition 10 requiring the existing DMP to be updated, in consultation with the DEC, to include the Port B operations. The EPA would not support the use of increased volumes of potable water for dust suppression.

Summary

Having particular regard to the:

- modelling predicting only a minor increase in dust levels at Point Samson and Wickham;
- Works Approval and Licence required under Part V of the *Environmental Protection Act 1986*; and
- recommended Condition 10,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for this factor provided the recommended conditions are imposed.

3.4 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Appendix 3 contains a summary of the EPA's consideration of the principles. The principles considered were as follows:

1. The precautionary principle:
   - Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

   In application of this precautionary principle, decisions should be guided by –

   (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and

   (b) an assessment of the risk-weighted consequences of various options.

2. The principle of intergenerational equity:
   - The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.

3. The principle of the conservation of biological diversity and ecological integrity:
   - Conservation of biological diversity and ecological integrity should be a fundamental consideration.

5. The principle of waste minimisation:
   - All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.

4. Conditions

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

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment.

4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Pilbara Iron Pty Limited to construct and operate a second port at Cape Lambert is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) Terrestrial fauna: limiting the amount of *Lerista nevinae* habitat that can be cleared to a total of 19.2 ha and providing for active management to ensure habitat values are maintained.
b) Light spill impacts on turtles; design and management of lighting to prevent lightspill to important turtle nesting areas
c) Underwater noise: the use of soft start up procedures to allow time for marine fauna to move away, ensuring dedicated marine observers are present during pile driving activities and ceasing of pile driving if whales and turtles are observed.
d) Dredging: ensuring that permanent loss of BPPH does not exceed 0.7 hectares.
e) Introduced marine pests: monitoring of vessels to detect if marine pests are present and development of management strategy in the event they are detected.
f) Dust: ensuring the Dust Management Plan that applies at the existing adjacent port operations incorporates the new facilities and throughputs.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V of the *Environmental Protection Act, 1986* – various Works Approvals and an operating licence would be required for construction and operation of the project;

- *Environmental Protection (Noise) Regulations, 1997* – for construction and operational noise;
- *Rights in Water and Irrigation Act, 1914* – licence for abstraction (dewatering for car dumper construction and ongoing operation);
- *Wildlife Conservation Act, 1950* – licence to handle and remove injured or trapped native fauna from marine and terrestrial construction areas;
- *Aboriginal Heritage Act, 1972* –s18 clearances.
- National Environment Protection Measure (NEPM) standards.
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* – listed and migratory species, Commonwealth waters.
- Commonwealth *Environment Protection (Sea Dumping) Act 1981* – disposal of dredge spoil.

5. Other Advice

Buffer zone and conservation area

The EPA supports the establishment of a buffer zone between the town of Point Samson and the industrial lease at Cape Lambert.

Ministerial Reserve 35813 is vested in the Minister for State Development for industrial purposes and is currently zoned for Strategic Industry under the Shire of Roebourne Town Planning Scheme Number 8. The EPA has been informed that the Shire, the proponent, and the Department of State Development have been reconsidering the future of this reserve and agree that the majority of the area should be re-designated to provide a landscape buffer between the Cape Lambert industrial development and the township of Point Samson. The EPA advices that the establishment of such a buffer would protect both:

- Port Samson township from dust and noise emissions from Cape Lambert industrial operations; and
- over 40 hectares of the limited remaining habitat of the conservation significant *Lerista nevinae* lizard.

The EPA therefore recommends that the re-designation of Ministerial Reserve 35813 for the purpose of conservation and industrial buffer be progressed.

Appendix 1

List of submitters

Organisations:
Centre for Whale Research
Dampier Port Authority
Department of Planning and Infrastructure
Department of Environment and Conservation – Environmental Management Branch
Department of Environment and Conservation – Environmental Regulation (Noise)
Department of Environment and Conservation – Industry Regulation (Pilbara Regional Office)
Department of Environment and Conservation – Marine Ecosystems Branch
Department of Health
Department of Indigenous Affairs
Department of Mines and Petroleum
Department of Water
Ngarluma Aboriginal Corporation
Point Samson Community Association
Shire of Roebourne
Western Australian Museum

Individuals:
There were no submissions from private members of the community

Appendix 2

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Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Terrestrial flora and vegetation	The Port B proposal includes clearing nearly 300 hectares of native vegetation in the Chichester subregion of the Pilbara bioregion. Vegetation to be cleared includes a range of community types but none are either priority or threatened ecological communities. The condition of vegetation communities varies with some areas affected by weeds and physical disturbance while others are in excellent condition. There are no declared rare or priority plant species within the areas proposed for clearing. In addition to direct impacts from vegetation clearing, Port B has the potential to indirectly impact flora and vegetation through the introduction of weeds, dust settlement, altered hydrology and altered fire patterns.	<u>Department of Planning and Infrastructure</u> • Vegetation clearing should be minimised and coastal habitats protected where possible. • Access to the beach should be formalised to prevent degradation of dune vegetation from multiple access points. <u>Department of Health</u> Weeds and feral animals should be controlled. Pesticides must be applied in accordance with the *Health (Pesticides) Regulations* 1956 and by licensed operators. <u>Department of Mines and Petroleum</u> Progressive rehabilitation of areas no longer required should be continuous throughout the life of the project. The rehabilitation of areas temporarily disturbed through construction activities, such as borrow pits and construction lay down areas, do not appear to be addressed in the PER. Progressive rehabilitation of areas no longer required should be continuous throughout the life of the project. It is noted that no environmental conditions in relation to closure are proposed by the proponent. In this case it appears appropriate to omit such conditions.	There is an absence of flora of special conservation significance and vegetation communities are generally well represented elsewhere. Flora and vegetation is therefore **not considered a key environmental factor in this assessment.**
Terrestrial fauna	<u>Short range endemic species (SRE)</u> Three potential SRE mygalomorph spiders were found within the proposal footprint, two of which were not found outside the footprint. The habitats for all three species are widely distributed. None of the three species correspond with species formally listed as specially protected fauna. The proposal outlined in the PER would have involved the clearing of	<u>DEC – Environmental Management Branch</u> • All three species of mygalomorph spiders have the potential to be either geographically restricted or short range endemics; i.e. their conservation status is unknown. • The proponent should consult with DEC and discuss the need for surveying additional areas to confirm the presence/absence of identified mygalomorph spider species outside the project footprint. • The capture locations of mygalomorph species need to be substantiated before they can be used reliably to predict species distribution. • EPA Guidance Statement 20 states that proponents are expected to seek advice from both the WA Museum and DEC in relation to a decision to rely on a risk-based assessment rather than undertake additional surveys.	**Terrestrial fauna is considered to be a key environmental factor and is assessed in section 3.1 of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	about 9 percent of the coastal dune habitat of the skink species *Lerista nevinae.* This species has a very restricted range limited to about 472 hectares. No portion of L. *nevinae* habitat is protected within reserves. Following publication of the PER, the proposal was changed and the predicted impact on L. *nevinae* habitat was reduced from 9 percent to 4.1 percent. <u>Listed species</u> Three Priority species listed under the *Wildlife Conservation Act 1950* were recorded in or near to the development area and a search of Western Australian and Commonwealth fauna databases identified an additional six species that potentially occur within the development area.	*Advice provided prior on the original proposal with predicted impacts on 9* percent of L. *nevinae habitat.* Given the potential for the Cape Lambert –Dixon Island occurrences of L. *nevinae* to be the only extant mainland population of this species, the removal of approximately 9 percent of its habitat and the fragmentation of remaining habitat could affect the conservation status of the species. • The habitat type in which L. *nevinae* is found is very poorly represented in reserves in the Pilbara and subject to a high level of threats from coastal development including a current development proposal near Dixon Island. • L. *nevinae* is likely to be of conservation significance because it appears to have highly specific habitat requirements and be restricted to a 18 km stretch of the coastal dunes. • This species has recently been collected from Dixon Island • Estimates of habitat loss at 9 percent not take account of the long term indirect impacts from altered hydrology, dust, noise, vibration, lighting and low level emissions such as hydrocarbons in storm water. There is a risk that a loss of 9 percent of the L. *nevinae* habitat will significantly impact the population because: • Port B would run along side 50 percent of the L. *nevinae* habitat and would form a major barrier to habitat connectivity. • Indirect impacts are difficult to predict; • Relative significance/importance of the habitat area in the footprint compared with areas outside the footprint are not understood; In relation to L. *nevinae*, it is recommended that further investigations be done to confirm the characteristics and distribution of suitable habitat and occurrence of L. *nevinae* outside the project footprint. In the event that impacts and risks to L. *nevinae* are considered acceptable, approval for the project should include a requirement for the following measures being undertaken to the satisfaction of DEC: • Development and implementation of a long-term monitoring program to determine whether this and other developments in the area are having an adverse impact on L. *nevinae*.	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		• Linkages between this monitoring program and remedial management measures so that managment impacts are detected. • Further research on the conservation status and ecological requirements of L. *nevinae*. • Commitments to undertake measures to enhance the protection of remaining L. *nevinae* habitat identified through monitoring and research. *Advice provided on the revised proposal with predicted impacts on 4.1% of* L. *nevinae habitat.* • Although the area of direct impact has been reduced, indirect impacts are still likely to result in significant additional impacts to *L. nevinae* habitat because there is a long adjoining boundary between *L. nevinae* and the development footprint. • Lerista nevinae will be subject to additional cumulative impacts associated with Mt Anketell & Dixon Island development proposals. <u>Western Australian Museum</u> • The land snail *Rhadada convicta* is correctly described as "of no special conservation status". • No specific information was given on the fauna survey sampling methods used. • Other land snails should have been found. However, many are very small and the survey may not have included techniques that would have found them. <u>Department of Health</u> Feral animals need to be controlled Proper disposal of wastes will prevent the attraction of vermin.	
Benthic primary producer habitats (BPPH) and dredging	Both soft sediment; mangroves and sparse seagrass, plus hard substrate; corals, turf algae and macro algae occur at Cape Lambert. The proposal requires the direct clearing of 0.4 hectares of intertidal	<u>OEPA – Marine Ecosystems Branch</u> • The local assessment unit boundaries and the scheme proposed in the management plan is consistent with the process outlined in EPA Environmental Assessment Guideline No.3. • The CSIRO review of dredge modeling concluded that the data meet the minimum requirements but that in some cases longer data sets would be beneficial. The modellers responded to this comment and stated that	**Construction dredging is considered a key environmental factor and is assessed in section 3.2 of the report.** There has never been the requirement for a major

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	BPPH and 0.3 hectares of mangrove habitat. The permanent loss of these habitat areas corresponds to very low (less than 2%) of the BPPH areas within management units defined in accordance with EPA Environmental Assessment Guideline No.3, *Protection of Benthic Primary Producer Habitats In Western Australia's Marine Environment* (EPA, 2009). A twelve month dredging program would reduce water quality by raising levels of turbidity and sedimentation. Worse case scenario predictions estimate temporary BPPH losses caused by dredging to be no more than 10 percent of BPPH areas within any management units. The proponent has committed to implement a reactive management program to ensure that BPPH threshold levels are not exceeded.	more data were being collected. • It is recommended that the establishment of an expert panel not be included in a Ministerial Statement. It should be made clear that the proponent has a responsibility to report exceedences of trigger values to the OEPA. An expert panel should not have a decision making role. <u>DEC – Environmental Management Branch</u> Any approval should be contingent on the following measures in relation to marine fauna: • Turtle deflector devices be used on all trailer suction dredges; • Pumps to be switched off when the drag head is lifted from the seabed; • Jet pumps be used to provide mobile water curtains during peak turtle nesting; • A marine fauna observer be engaged to maintain watch during dredging and start-up, and shutdown procedures applied should a marine turtle be observed within 5m of the drag head; The proposed medium to large trailer suction dredge is more likely to cause impacts to turtles than smaller equipment; It is recommended that: • Prior to the commencement of seabed disturbing activities the BPPHs be mapped in more detail; • The DSDMP should be developed to the satisfaction of DEC; • The proponent should report regularly to confirm their compliance with: - Net mortality of coral not more than 0 percent in management units 1A and 1B; - Net mortality of coral not to exceed 10 percent in management units 2, 3, and 4; - Net mortality of coral not to exceed 0 percent within the predicted zones of influence of management units 2, 3 and 4; - Net mortality of mangroves not to exceed 2 percent within management unit 5. • Indicators of sub-lethal stress and water quality parameters should be applied to provide triggers for management responses. Triggers and management responses should be outlined in the DSDMP. • The DSDMP should include methods to identify and predict significant mass coral spawning.	maintenance dredging program at Cape Lambert Port A. Maintenance dredging is therefore not expected to result in significant impacts at Port B and is not considered further in the Port B report.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		• Spoil disposal at the outermost sites should be carried out in preference to disposal in State waters because this site is closer to sensitive environments at Delambre Island. • Lumping hard substrate BPPHs into a single category of BPPH mosaic makes it impossible to effectively monitor and determine the level of loss of each specific habitat e.g. coral. Approval should be contingent on the assignment of appropriate limits to loss of specific benthic habitat types. • The comparison of median values of water quality at impacts sites should be compared with upper percentiles of reference sites. • Figures for lethal stress are also required as early warning indicators to trigger management responses and prevent coral health criteria being exceeded. <u>Department of Planning and Infrastructure</u> Dredge modelling includes some assumptions: - Dredge log simulations are not accurate; - It is not clear how representative the sediment samples were that were used to populate the model. This would influence rates of sediment suspension generation from the dredge, propeller wash and re-suspension.; - The relationships between sedimentation, turbidity/light attenuation and coral health and the natural tolerance or susceptibility of the benthic habitat ; • There is no consideration of the natural background turbidity or sedimentation, and in turn no consideration of the compounding impacts of dredging on top of natural occurrences. • If all of the assumptions in the model are treated conservatively, this can result in conservative estimates of impacts. This can lead to inefficient siting of monitoring locations, typically beyond/outside areas of impacts; and the development of unnecessarily high thresholds within environmental conditions. For example, allowance for a percentage loss of coral habitat which , due to the conservative nature of the original estimate, is very unlikely to be exceeded. • It is recommended that a preventative adaptive management framework be put in place involving the continual re-forecasting (on a weekly basis) of impacts and the adjustment of the dredging program to minimise	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		impacts based on the forecast weather conditions and known state of the dredging plume. • The proponent should be requested to contribute to scientific research to improve knowledge of the relationships between water quality and coral health including coral spawning, the rates of sediment re-suspension, and natural background conditions. • All dredging data and analysis should be made publicly available. <u>Dampier Port Authority</u> • The volumes of dredge material calculated do not take account of bulking and should be redone. • No indication has been given of likely maintenance dredging requirements. • The capacity of spoil grounds to take dredge spoil from maintenance dredging has not been addressed. • The establishment of a dredging advisory group is a good idea and the Dampier Port Authority would welcome involvement. • The Pluto project has established significant volumes of data on spawning windows in the area and has developed a standard management approach.	
Marine Wildlife	A total of 13 marine mammal species listed under the EPBC Act are likely to occur within the waters surrounding the Port B development. Of these, the blue (*Balaenoptera musculus*) and humpback (*Megapera novaeangliae*) whales are also listed as rare or likely to become extinct under the *Wildlife Conservation Act 1950*. Humpback whales migrate past Cape Lambert to the north. Recent information indicates that they often come close to the coast and rest in Nickol Bay. Intensive noise emissions during a	<u>DEC – Environmental Management Branch</u> • DEC recommends that the proponent considers the residual impacts of this development on marine turtle habitats and the need for provision of marine turtle conservation mitigation and/or offsets for these impacts. • Flatback turtle nesting on mainland Western Australia is characterised by low density nesting across a large area. Nesting sites on the mainland cannot be directly compared to high density nesting sites on islands. In this context, the presence of 200 nesting females on one beach on the mainland is regionally significant. • The relationship between beach temperature and sex ratio of turtle hatchlings may also affect the importance of specific mainland beaches for species conservation. • Other important habitat for flatback turtles is currently subject to threats. • It is DEC's view that all remaining turtle habitats warrant protection and management.	**Marine wildlife is considered a key environmental factor and is assessed in section 3.2 of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	proposed pile driving program have the potential to impact humpback whales. Noise emissions are considered further under the pollution section below. Six species of marine turtles inhabit the waters around Cape Lambert and three species of marine turtles (flatbacks *Natator depressus*, greens *Chelonia mydas* and hawksbills *eretmochelys imbricata*), nest on beaches adjacent to Port B. It is estimated that on average 90 to 100 flatbacks nest on Bell's Beach, and 10 to 15 flatbacks nest on Cooling Water Beach each year. Flatback, green and hawksbill turtles are listed in Schedule 1 of the *Wildlife Conservation Act* 1950 as species that are rare or likely to become extinct. They are also listed as vulnerable under the EPBC Act. Elements of the proposal with the potential to impact turtles include: • Light spill (addressed in the pollution section below); • Underwater noise (addressed in the pollution section below); and • Dredging. Some turtles forage on benthic communities vulnerable to the effects of dredge plumes. They can also become trapped in dredging equipment.	<u>Department of Planning and Infrastructure</u> A Marine Turtle Management Plan should be prepared <u>Centre for Whale Research</u> • Statements that the humpback migration route is 28 km from the pile driving activities indicates a lack of understanding of humpback whale migration patterns. The migration pathway is up to 50km wide and humpback whales have been sighted off Cape Lambert on their northern migration. • The closest humpback whale migration data to Cape Lambert is from 50km in the Dampier Archipelago in 1990 to 1994. At that time the population was approximately 3,800 animals. The population has since recovered to about 20,000 animals and it is likely that both the temporal and spatial boundaries of the migration has expanded. It is therefore not possible to say where the migration path lies in relation to Cape Lambert. • It is known from elsewhere on the WA coast that cow/calf pods migrate south in shallow waters (<20m) and recent anecdotal reports from prawn fishers suggest that cow/calf pairs are using Nickol Bay (20km west) as a resting or nursing area. • Dedicated surveys should be conducted prior to pile driving to determine the baseline distribution and abundances of whales, dolphins, dugong and turtles in keeping with similar coastal infrastructure projects. <u>Point Samson Community Association</u> • The islands off Cape Lambert are important turtle rookeries. • Port B impacts on turtles should be considered broadly, not restricted to nesting beaches. • Our organisation disputes the validity and intent of turtle surveys that are restricted to just 2 weeks during the peak nesting season. • Port B has the potential to significantly impact turtles • There is no meaningful and well structured turtle research programme so it would be impossible for the proponent to demonstrate a negligible threat to Cape Lambert turtle rookeries. • There is anecdotal evidence relating to hatchlings massing around floodlit bulk carriers at anchorage. • Long term turtle research is urgently needed.	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Estimates of dredging impacts on BPPHs, indicate that less than 10 percent of the BPPHs within any management unit will be impacted during the dredging program. Following the cessation of dredging, these benthic communities are expected to recover. The proponent has committed to install turtle exclusion devises and to use water jets to deter turtles where possible. Some species of turtles also forage on soft coral and sponge communities. An area of this community would be lost beneath dredge spoil. Soft coral and sponge communities are widespread within the region.	• The requirement for turtle research needs to be addressed in the Ministerial Statement. • Humpback whale migration routes depicted in proponent documentation are incorrect. Large numbers of humpback whales come close to Point Samson and linger for lengthy periods in Nickol Bay. Daily whale numbers observed by locals and professional fishermen south of Delambre Island often exceed 30 adults.	
Water resources	Port B operating requirements are estimated to be 2.6 GL of water per annum. The majority of this water would be required for dust suppression. There are no large supplies of fresh water readily available in the Cape Lambert area. Requirements for potable water at Port B are planned to be met by the existing Water Corporation scheme. However, in the event that the Water corporation is not able to meet the demand at Port B, temporary water sources may be required. A small desalination plant or other temporary water source would be	<u>Department of Water</u> The PER stated that demands for construction water will be met by the West Pilbara Water Supply Scheme (WPWSS) and shortfalls will be met by temporary water sources. However, the WPWSS is close to full capacity and potentially does not have the licensed capacity to deliver the stated volumes. The scheme is also operating above the sustainable yield of the Millstream Aquifer and this could cause considerable stress on the system. The PER fails to outline contingencies to meet temporary water supply demands as well as show strategic consideration of how water supply will be delivered in the medium to long term. The DoW strongly supports the preferred option to develop a bore field at Bungaroo that is connected to the existing WPWSS. But there is not enough information to assess this option which will not be submitted to the EPA until 2009/2010. Separating the assessment of water sources from the Port B assessment could	Medium to long term access to water is part of a regional issue that involves several agencies and other consumers. The EPA notes that the proponent is investigating a range of water source options including the establishment of a bore field and desalination. Both of these short term and longer term options will be subject to separate EPA referrals . **Water resources are therefore not considered a key factor in this**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	the subject of a separate EPA referral. The consideration of long term options for alternative water sources has involved the Water Corporation and other consumers in the region. The preferred option is to develop a borefield at Bungaroo that would feed into the Water Corporation scheme. This option would be the subject of a separate EPA referral. The proponent has developed management plans to minimise the use of water, initiate water reuse and savings initiatives, use sea water and chemical dust suppressants .	place considerable pressure on the DoW and Corporation should the port proposal be approved before water requirements have been assessed. It is imperative that water requirements be assessed as part of, or in parallel to this proposal, and this requires the provision of additional information. DoW supports the application of water efficiency initiatives <u>Department of Health</u> Limited detail has been provided about water quality from Bungaroo. Once this source has been fully evaluated, its use would need to comply with the Australian drinking Water Guidelines. <u>DEC – Industry Regulation</u> • The WPWSS is currently above its sustainable yield. • It should be noted that the Bungaroo mine has not yet been approved by the EPA and there are subterranean fauna issues at this site. • More investigations into a secure water source should be carried out. • The existing Water Management Plan for Cape Lambert needs to be updated. • The proponent should determine the quality of water from dewatering and describe the use, discharge or treatment of this water with DEC.	**assessment.**
Planning for climate change	Sea level rise has the potential to inundate portions of the proposal area and to result in the progressive erosion of shorelines and dunes.	<u>Department of Planning and Infrastructure</u> • Climate change doesn't seem to have been taken account of. The study area is largely low lying flat coastal plains. • It is vital that sea level rise be considered and it is recommended that a climate change impact assessment be undertaken. • The locating of facilitates should be in accordance with State Planning Policy 2.6 (State Coastal Planning Policy), and consider potential impacts of climate change over the next 100 years. • It is recommended that there be an assessment of shoreline stability, including the impacts of coastal inundation and erosion to ensure that any risk of damage from coastal processes can be avoided. • It is recommended that development be set back from any areas that would potentially be inundated by the ocean during the passage of a category 5 cyclone tracking to maximise its associated storm surge.	The EPA is of the view that all structures will be designed to withstand projected climatic changes within the life of the project. **Planning for climate change is not discussed in more detail in the body of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		• Any development that may pose a pollution risk if damaged by a storm surge should be set back sufficiently to reduce the impacts on adjacent coastal and marine environments.	
POLLUTION			
Light spill	Artificial lights disorientate adult and hatchling turtles causing them to move away from the ocean towards inland lights. Illuminated infrastructure associated with stockpiles is proposed within 150 m of nesting sites on Bell's Beach. Jetties are also illuminated and bright lights are used by ships at anchor and at the wharves. Management commitments to minimise impacts on turtles from light spill include: • The incorporation of design features to minimise light emissions: • The protection of foredunes which shadow Bell's Beach; - The implementation of an adaptive management framework that involves: - monitoring light levels, - Monitoring turtle nesting and hatchling success; - The adjustment of lighting design; and, - A potential nest intervention program if impacts are high.	<u>DEC – Environmental Management Branch</u> • Recommended that the stockyard furthest from Bell's Beach be developed first allowing time for monitoring and refinement of design to demonstrate impacts of lighting of expanded proposal are acceptable. • The majority of Cooling Water Beach would be impacted by direct light from Port B with values being up to two orders of magnitude greater than existing light values. The study confirms that this level is likely to affect turtle hatchlings. • Despite modelling results indicating that 95% of Bell's beach would remain in shadow, light glow from infrastructure is likely to impact on turtles when they are near the water's edge where the shielding angles from dunes are less effective. This additional light glow has the potential to affect female turtles and potentially decrease nesting success. • Light spill and glow from the wharf and jetty could attract/aggregate hatchlings exposing them to increased predation. • There is potential for light glow from Port B to disorientate hatchlings at island rookeries. The extent of this impact is uncertain. Project approval should be contingent on: • The stockyard furthest from Bell's Beach should be developed first. • 95% of Bell's Beach should be management to maintain shadow. • The light model should be validated and light monitoring used to inform design and management of subsequent port expansions; • Light glow on all areas of Bell's Beach should not exceed the accepted horizontal illuminance of full moon light intensity. • Light horizons on turtle nesting beaches at Delambre, Legendre and Hauy islands and Cleaverville Beach should not be altered from current conditions; • Design features, management measures and operating controls should be implemented to avoid adverse impacts including light shielding, lighting of appropriate wavelength and intensity.	**Light spill is considered a key environmental factor and is discussed in section 3.2 of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		• Monitoring to identify light emissions from each phase of the development and to detect adverse impacts on adult and hatchling turtles under a range of ambient conditions. • Contingency and remedial measures be applied in the event that monitoring indicates adverse impacts on the Bell's Beach, Cooling Water beach and island rookeries; • Regular auditing be undertaken to review the effectiveness of light mitigation measures and demonstrate that target conditions are continuously being achieved. • The dune system separating Bell's Beach from the stockyard facility not be disturbed.	
Noise	The Port B development is about 5km from the community of Point Samson and about 4 km from the town of Wickham. Boat Beach is a popular recreation beach and a yacht club is located between Boat beach and Bell's Beach just 300 m from the proposed development. Received noise levels at these sensitive receptors would be the result of cumulative emissions from Port A, Port B and other industrial operations in the area. Noise sources during construction include heavy machinery, pile driving, blasting from an adjacent quarry (not part of this proposal). Noise sources during port operations would include trains, car dumpers, conveyors and other fixed plant machinery. Noise modelling indicated that noise levels at Point Samson would be non-compliant with the *Environmental*	<u>DEC – Environmental Regulation Noise Branch – advice on information presented in the PER</u> • DEC Noise Branch has assessed the proponent's noise regulation 17 application to the Minister for Environment and recommends that there is no solid evidence that the noise from Cape Lambert operations cannot comply with the noise regulations. • Noise Branch considers the modelled level of 60 dB (A) assigned to Boat Beach to be an overestimate of what will be received. • The Noise Branch recommended that the Proponent develop an 'aspirational goal' for Boat Beach in consultation with the community. The PER indicated that this has not been completed. <u>DEC – Industry Regulation – advice on information presented in the PER</u> • To date, there have been no significant complaints or issues about noise at Point Samson. • The proponent has committed to best practice noise mitigation measures for Port B and will retro-fit improvements at Port A. The cumulative impacts will therefore be an improvement on existing noise levels. <u>Shire of Roebourne – advice on information presented in the PER</u> • Modelling predicts continuing noise exceedences so the proponent should seek an exemption under s17 of the *Environmental Protection Act* . • The Shire requests that an independent audit of all noise sources be undertaken.	Noise emissions are subject to controls under Part V of the *Environmental Protection Act 1986*. Following a decision by the Minister for Environment not to grant and exception under s17 to vary assigned noise levels at Point Samson, DEC can impose appropriate works approval and licence conditions, to ensure that noise levels comply with the assigned levels set out in the *Environmental Protection (Noise) Regulations 1997* . In recognition that noise will be effectively managed by DEC under Part V of the Environmental Protection Act, **noise is not considered a key factor for this assessment.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Protection (Noise) Regulations 1997. Modelling also indicated that noise levels at Boat Beach would approach 60dB which would significantly reduce its amenity value. No exceedences were predicted at Wickham. Based on the noise modelling, the proponent applied under s17 of the *Environmental Protection (Noise) Regulations 1997* to vary the assigned noise levels applicable to Point Samson. An independent assessment was conducted by DEC which included field measurements and a review of the noise modelling. DEC advised that the proponent's noise modelling overestimated likely noise levels at both Point Samson and Boat Beach. Based on this advice, the EPA formed the view that, with best practice management and infrastructure design, the proponent would be able to comply with the Noise Regulations. This advice was forwarded to the Minister for the Environment who determined in September 2009 that a s17 exemption would not be granted and the proponent therefore has to manage noise emissions to within the limits specified in the Environmental Protection (Noise) Regulations 1997. The proponent has committed to upgrade infrastructure at Port A and to install infrastructure that minimises	• Planned designs to minimise noise emissions including initiatives to minimise noise emissions from the rail line should be set out in Ministerial conditions. • Wickham is vulnerable to increased rail noise. • Noise emissions have historically lead to a high level of complaints from Wickham.	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	noise emissions from Port B. A noise monitoring program would also be implemented.		
Underwater noise	Intensive noise emissions can cause death, injury, hearing loss, behavioural changes and masking of wildlife communication. It is unlikely that blasting would be required during the dredging program. However, if it was required, the proponent has committed to prepare a management plan outlining likely emissions and management frameworks. Pile driving is the most significant source of noise during port construction. Up to three impact hammer pile drivers would be used concurrently, each striking its pile about every second. It takes several hours to drive each pile and the pile driving program is predicted to last about 1 year. Management would include: • The deployment of a Marine Fauna Observer to watch for sensitive marine wildlife; • Implementing a soft start up procedure to gradually increase noise levels as a warning; • Restricting pile driving operations to daylight hours during turtle nesting;	<u>DEC – Environmental Management Branch</u> • Any approval for the project should be contingent on the following noise mitigation measures: - Soft start-up procedures over 15 mins; - An exclusion zone of 500m radius within which piling should not commence until all sensitive wildlife are outside; - An exclusion zone of 100m radius within which piling should stop if sensitive animals enter; - Piling and blasting should not take place at night so that wildlife observations can operate and to minimise impacts on nesting turtles; - A blasting management plan should be developed to the requirements of DEC prior to blasting operations. • Marine wildlife, in particular turtles and whales are known to be sensitive to noise emissions and in this case noise levels will be intense enough to cause injury. • Pile driving may deter turtle nesting and cause injury including hearing loss within 100m. Hatchlings are likely to be injured within 500m from pile driving. • Other marine wildlife could suffer temporary threshold shift. • Most whales and dolphins are likely to move away from pile driving but precautionary measures to prevent adverse impacts are recommended. • There is no conclusive evidence to determine threshold injury and avoidance thresholds. <u>Centre for Whale Research</u> • The Underwater Noise Assessment technical report states that "humpback whales seem to show high levels of tolerance to man-made noise and it is therefore expected that pile driving operations will have little effects on the whales." There is no basis for this conclusion. • So little is known about the auditory properties of whales that no real conclusions can be made regarding the potential for hearing damage in these animals. • The potential masking and behavioural change are likely to be significant	**Underwater noise is considered a significant environmental factor and is discussed in section 3.2 of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	• The avoidance of piling close to Cooling Water Beach during the peak turtle nesting season.	issues for long term pile driving activities. Point Samson Community association Construction activities, particularly pile driving and underwater blasting should be forbidden during the southern migration of humpback whales.	
Dust	Under certain conditions, dust from Port A contributes to elevated PM_{10} concentrations at Point Samson which is located about 4 km away. These levels exceed the NEPM standards and cause community concerns. Port B would significantly increase the potential for elevated levels of dust at both Point Samson and at the township of Wickham which is about 4 km from Port B. Dust emissions from Port A are managed through a Dust Management Plan and licence conditions under Part V of the *Environmental Protection act 1986*.	DEC – Industry Regulation Pilbara Region • There is a history of dust concerns from residents of Point Samson. • Exceedence of NEPM Ambient Air Quality Standards (50 µg/m3) at Point Samson occurred 24 times between 2004 and 2007. • There is an increase in the number of exceedences occurring annually which is of concern. • It is not clearly demonstrated in the PER that the proponent will stay below NEPM standards. • The proponent has committed to use best available technology for dust minimisation in the design of Port B. • Monitoring will continue at Point Samson, Wickham and background locations plus two monitoring locations between port operations and Point Samson. • The proponent has made all their monitoring results available on the internet. • The proponent consults the community through a Coastal Community Environmental Forum. This should continue. • The current Cape Lambert Dust Management Plan needs to be revised to incorporate the arc of influence for Port B. • Air quality modelling will predict ambient air quality only if background levels are incorporated. Department of Health – advice on information in PER (*background levels were subsequently included in dust level predictions)* • An assessment of impacts of particulate matter on the community of Point Samson is hampered by the omission of background concentrations. • The modelling data under-predicts the particulate matter concentrations at Point Samson. • Levels of PM_{10} regularly exceed NEPM standards at Point Samson and Wickham.	**Dust is considered a significant environmental factor and is discussed in section 3.3 of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		• Visual monitoring is not appropriate in residential areas. <u>Shire of Roebourne</u> • Given the basic design of Port B is the same as Port A the very small predicted increase in dust emissions is difficult to accept. • An independent audit of all dust sources should be undertaken. • Identified design improvements should be made conditions in the Ministerial approval. • The Shire requests specialist briefings from the Proponent and the EPA and DEC about dust. • Although Wickham is not currently impacted by dust from Port A, its close proximity to Port B will make it vulnerable to dust impacts. • Dust estimates should include dust lift-off from rail operations because rail movements past Wickham will increase by 150 percent. The covering of rail cars or use of dust suppression coatings should be the subject of conditions. • An alternative operational design would be to site the stockpiling and screening operations inland and to use a feed conveyor to link with the port load-out facilities. This option should be considered. <u>Point Samson Community Association</u> • Disappointed that the proponent has used the term "potential nuisance issue" when referring to dust impacts on residents. • Dust effects on residents include: - Filth on external surfaces; - High costs associated with having to clean houses, cars etc and run air conditioning because unable to open windows; - Reduction of property values; - Accelerated corrosion; - Damage to vegetation. • There is concern that background levels are overstated to shift responsibility of exceedences from the proponent. • The community is not confident with modelling results and interpretations. • The ship loader conveyor that runs along the jetty needs to be covered in line with best management practice. • Background contributions need to be measured at a representative location like Bezout Island or other islands (note the CSIRO levels established on	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		the Burrup). • The proponent should develop measures that record community experiences e,g, surface deposition, and there should be standards set over short periods so that the real peaks are not averaged out over long periods of time. These short period standards should trigger management actions. • Residents should be recompensed for dust problems based on enforceable performance levels in the Ministerial Statement. • Dust and noise impacts are worst during windy conditions. Fast management responses are required under adverse weather conditions. <u>Department of Planning and Infrastructure</u> A Dust Management Plan should be prepared	
Greenhouse gas	Carbon dioxide emissions during construction are predicted to be 44,000 tonnes CO_2 –e per year. Approx 105,000 tonnes CO_2 –e per annum will be emitted during the operational phase of Port B.		Because it is likely that the proponent would be required to participate in a nationally applicable scheme to reduce carbon emissions, **greenhouse gas emissions have not been considered a key environmental factor in this assessment.**
Hydrocarbon storage, transportation and handling	Diesel fuels will be required during contraction and be stored in a temporary facility.	<u>Department of Mines and Petroleum</u> • Storage facility to comply with Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007. • Storage tanks to be designed in accordance with Australian Standards AS1692-2006 "Steel tanks for flammable and combustible liquids". • Diesel to be stored and handled in accordance with AS1940 – The storage and handling of flammable and combustible liquids." • Storage facility to be licensed under existing Cape Lambert dangerous goods site licence (DGS015722).	Hydrocarbon storage, transportation and handling will be managed under existing licenses and in accordance with existing Regulations and Australian Standards. **Hydrocarbon storage, transport and handling has not been identified as a key factor for this assessment.**
Surface and ground water discharge	There are no significant drainage lines within the Port B footprint. However,	<u>DEC – Industry Regulation</u> • The exact locations of the new surface water discharge point and water	Dewatering plus the management and discharge of

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Port B may alter the natural flow of ephemeral drainage lines and areas subject to occasional inundation. Cape Lambert is subject to seasonal storms and cyclonic rain events with the potential to cause significant erosion, sedimentation and the runoff of sediment laden waters. Two surface water discharge points are proposed: • Discharge to Sam's Creek; and • Discharge to the ocean west of the existing quarry. Discharge of water to the environment is expected to occur infrequently. Dewatering is required to construct and operate the car dumpers. No groundwater-dependent vegetation is located in the area. Subject to water quality parameters, water from dewatering is to be used for dust suppression.	monitoring sites need to be provided. • Surface water discharge is assessed and regulated in works approvals and licences so the proponent will need to provide details of their monitoring program and impacts on the marine environment for the Part V assessment. • It will have to be demonstrated that these discharges meet the ANZECC water quality guidelines for marine water and that there are no significant impacts on marine ecosystems. • The revised Water Management Plan will need to include commitments, procedures of proposed mitigation, management and monitoring . <u>Department of Planning and Infrastructure</u> With the proximity of the proposed Dampier Archipelago Marine Park, it is important that Port B does not discharge waste and/or storm water in a manner that may degrade the coastal environment. <u>Department of Mines and Petroleum</u> There is potential for some of the disturbance areas (including borrow sources) to be located in areas of high to medium risk of acid sulphate soils <u>Department of Planning and Infrastructure</u> A Water Management Plan should be prepared. <u>Dampier Port Authority</u> No details are provided for the storm water management on the wharf structure where impervious surfaces are proposed. These areas are likely to contain ore fines which could wash off into adjacent marine areas during rainfall events.	surface water will be managed under licences from DoW and DEC. In recognition that water is managed by these other authorities, **surface and groundwater management has not been identified as a key factor for this assessment.**
Waste materials	During the construction and operation phases of Port B, solid and liquid wastes are likely to include: • Inert solid waste such as general office waste, packaging materials and scrap steel; • Hydrocarbon waste - oily rags, oil filters, waste oil and waste grease; • Building and demolition wastes -	<u>Department of Health</u> In relation to waste water disposal, all systems must utilize Department of Health approved products and have current approvals in place. <u>Dampier Port Authority</u> There are no facilities for ships to offload wastes. As Australia is a signatory to the MARPOL 73/78 convention, some consideration to compliance with this convention, especially Annex V should be incorporated. Information can be drawn from a needs analysis based on current ship requirements.	The proponent has committed to manage waste materials in accordance with all relevant State and Commonwealth standards pus company waste management Environmental Management Plans and Procedures. The EPA therefore considers that this

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	packaging materials, steel off-cuts, concrete, electrical off-cuts); • Food waste; • Sewage waste; and • Rubber from conveyor belts. The proponent has developed Environmental Management Plans and Procedures to ensure the appropriate management of waste materials.		factor can be appropriately managed under Part V of the *Environmental Protection Act*. **Waste materials is not considered to be a key factor for this assessment.**
Shipping management	Cape Lambert is within the gazetted port of Port Walcott which is managed through the Marine Safety Division of the Department of Transport in Perth. 600 to 800 bulk carrier per year are expected to service Port B. There are also several hundred vessels servicing Port A. The approach to both Port A and Port B is along a single dredged channel to the north. The speed of vessels in the dredged channel is between 8 to 12 knotts, slowing to 4 knotts as they approach the wharf. The proponent has stated that spill response planning is in place to deal with catastrophic large spills from vessel collision or grounding. Prevailing winds are south-easterly in winter and westerly in spring and summer. These offshore winds would reduce impacts from a large oil spill on the mainland. Shipping activities have the potential	<u>Dampier Port Authority</u> Cape Lambert is not within the Dampier Port limits but there would be significant advantages if it was. The Dampier Port Authority would encourage discussion regarding management of the area with the added benefit to environmental management. <u>Shire of Roebourne</u> • The PER does not address the increased risks associated with oil spills. • Oil spill response capabilities need to be considered in detail, • Port Walcott is currently controlled from Perth which raises questions about the ability of these current arrangements to provide for the most appropriate management of shipping. • The Shire recommends that the EPA report on Port B include a recommendation that the management of shipping and associated marine activities be reviewed with the objective of specifying the most appropriate management arrangements and controls. • Any approval for Port B should include a requirement for the proponent to contribute to on-going sea and shore monitoring and management of marine pollution. <u>Point Samson Community Association</u> • Port B will see 1150 large bulk carriers anchoring berthing loading and sailing via a narrow dredged channel every year with significant risks of a marine incident and possible oil spill. • The proponent should undertake a thorough and detailed fully independent risk analysis of the proposed marine operation in all its facets and	**Marine pests is considered a key environmental factor and is discussed in Section 3.2 of the report.** Oil spill planning and response procedures are subject to national standards and coordination. Therefore **oil spillage is not considered a key environmental factor for this proposal.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	to introduce marine pest species to Cape Lambert. Introduction can take place either via the discharge of ballast water or via biofouling of ships hulls and other surfaces. International standards are in place for managing ballast water and the proponent has committed to implementing a vessel inspection and clearance procedure for dredges.	implement appropriate strategies so as to provide a 'best practice' marine operation and oil spill response capability. This would be reflected in the Ministerial conditions. • The community has concerns regarding whether the port operator has the equipment, specialist knowledge and trained staff to provide rapid and best practice response to serious marine incidents. • There is little faith that an oil spill would be contained before it reached the Point Samson beach. • Residents pick up rubbish from the shore which comes from bulk carriers and there is most likely surreptitious night time disposal of waste into the sea. The PER does not deal adequately with the issue of marine waste. • Many members of the community have concerns about what appears to be uncontrolled anchoring; damaging benthic communities in an effort to choose areas with good fishing prospects.	
Proposed buffer zone	The Port B expansion will place further pressure on the interface between the industrial operations at Cape Lambert and the residents and urban assets of Point Samson. The Shire, the proponent and the Department of Minerals and Petroleum have been considering the future of a Ministerial Reserve [35813] which provides a natural buffer between the two areas. The land is also currently zoned for "Strategic industry" under the Shire Town Planning Scheme. The Shire and the Proponent have been in broad agreement on the most appropriate status for the reserved land.	<u>Shire of Roebourne</u> • The Department of State Development has now indicated its willingness to work with the Shire and the proponent to recommend to their Minister that the land be re-designated as a buffer area. • The Shire recommends that the EPA report on Port B includes a recommendation to Government to facilitate the re-designation of Reserve [35813] for the principal purpose of providing a landscape buffer between the industrial development at Cape Lambert and the township of Point Samson. <u>DEC – Industrial Regulation</u> • The designation of a buffer between Cape Lambert and the town of Point Samson would avoid the significant emissions issues that occur at Port Hedland. • The proposal for a buffer is supported at local community meetings. <u>Point Samson Community Association</u> • This community group has worked hard with the proponent and the Shire of Roebourne to facilitate the rezoning of Vacant Crown Land between Point Samson and Cape Lambert to that of Conservation and Buffer Zone. • The desirability of a Buffer Zone is compelling and planning issues at	While supporting the concept of a buffer, the EPA notes that it is not on land managed by the proponent. **The proposed buffer is therefore not considered part of the assessment for the Cape Lambert Port B proposal and is addressed only in the Other Advice, section 5 on page 30, of the report.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		places like Port Hedland, Dampier and Esperence makes the requirement fairly obvious. • The recent change of government and shuffling of senior Rio Tinto staff appears to have effectively stalled progress in establishing the buffer. • The Point Samson Community Association requests that the EPA and Minister progress the establishment of a suitable Buffer Zone as a precursor to project approval.	
Project staging	The Port B proposal includes 4 berths plus the dredging for additional berths and the vegetation clearing for double the stockpile area.	Shire of Roebourne Port B will ultimately have 8 berths and the full sized facility should be assessed now so that all cumulative impacts are considered. Ngarluma Aboriginal Corporation Given the recent announcement of the joint venture on Pilbara iron ore operations with BHP Billiton the current proposal should be shelved until it is known whether the joint venture will proceed. i.e. the current ort B proposal is probably already out of date.	The EPA has assessed the Port B proposal as presented.
SOCIAL SURROUNDINGS			
Aboriginal and Heritage values	Native Title Cape Lambert and the Wickham township are located within the Ngarluma/Injibandi determined Native Title area. Ngarluma's country extends over much of the port and rail infrastructure area. An initial agreement was reached in May 2008 between the proponent and the Ngarluma Aboriginal Corporation. The Proponent has stated that they wish to engage the Ngarluma Aboriginal Corporation to reach a sound agreement and establish a firm, enduring relationship. Heritage	Department of Indigenous Affairs The Registrar (of the DIA) is satisfied that the proponent will comply with the provisions of the *Aboriginal Heritage Act 1972* and undertake consultation with the relevant Traditional Owners regarding heritage matters. Ngarluma Aboriginal Corporation (NAC) • There are Aboriginal sites in the development area. • It is an affront to Traditional Owners to work in any part of Ngarluma Country without consulting the Ngarluma people. It is a breach of Ngarluma people's cultural responsibilities and obligations if this happens. • It is the responsibility of Ngarluma people to protect people working in the area against various dangerous Dreamtime spirits and forces within Country. • The proponent has not allowed Ngarluma people access to flora and fauna surveys which denies opportunities to pass on knowledge to the children. Participation in flora and fauna surveys is a vital method by which Ngarluma people continue to access Country that is otherwise now largely inaccessible.	While recognising that communication difficulties exist, the EPA does not have a role in discussions between the Ngarluma Aboriginal Corporation and the proponent. The DIA advises that there will be compliance with the *Aboriginal Heritage Act 1972* and an agreement between the Ngarluma Aboriginal Corporation and the proponent provides a framework for consultation. Therefore, **Aboriginal and heritage values have not**

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	Known sites in the region include shell middens, standing stones, stone features, grinding patches, quarries, occupation scatters and rock art. Results from previous heritage surveys in the Cape Lambert region indicate that 65 Aboriginal heritage sites occur close to, or within, leases held by the proponent. Heritage surveys for the Port B development commenced in August 2008. They are approximately 40 percent complete. Preliminary advice indicates that a number of archaeological sites have been recorded within the Port B footprint. Once the heritage surveys are complete, the proponent has committed to avoid impacts wherever possible and to seek Section 18 consents to disturb sites which cannot be avoided.	• Aboriginal Heritage surveys are incomplete. • The Cultural Heritage Management Plan has been prepared without consultation. • There has been no consultation with the Ngarluma people. • NAC had lodged objections under the *Native Title Act 1993* to infrastructure expansion. • The EPA must consider Aboriginal Heritage and ensure that the proponent has properly addressed it. • The proposal will destroy Aboriginal sites and so "adversely affect matters of heritage significance' to the Ngarluma people. • Lack of consultation undermines the standing of Elders in the eyes of young members of the community. • If Ngarluma Elders have been through the Aboriginal Law. They cannot leave Country to be destroyed. To do so would be to sanction the destruction of not only Traditional Country, but the Ngarluma culture as well. <u>Department of Planning and Infrastructure</u> A Cultural Heritage Management Plan should be prepared	**been considered a key environmental factor in the assessment.**
Recreation	Boat Beach is the main recreational beach close to Wickham and there is a recreational beach at Point Samson. The waters off Cape Lambert provide opportunities for recreational fishing. Fishers target subtidal reefs and rocky shoals. Boat ownership in the region is high with boat launching facilities at Boat Beach, Point Samson, John's Creek and Cossack. Pile driving may result in some fish	<u>Department of Planning and Infrastructure</u> • Vegetation clearing should be minimised and coastal habitats protected where possible. • Shire of Roebourne's town planning scheme incorporates objectives for the Cape Lambert area including retaining access to key coastal recreational nodes. • While the development should not impede public enjoyment of the adjacent beaches, access and pathways should be formal, with adjacent signage and fencing to ensure security and safety of the public. <u>Shire of Roebourne</u> • The rail infrastructure for Port B will heavily restrict or effectively	The proponent has committed to maintain public access to Boat Beach and has implemented management controls to limit vehicle access through sensitive dune vegetation and onto Bell's Beach. **Recreation is not considered a key environmental factor in this assessment.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	moving away from the Cape Lambert area. Dredging has the potential to intermittently reduce water quality at popular areas like Point Samson.	preclude public access to Boat Beach. • The Shire recommends that the proponent funds alternative access and facilities to recreational values.	
Health	The Cape Lambert Port B development is located in an environment that experiences nuisance (biting) insects. Mosquitoes are likely to be the most common problem but other biting flies, especially tabanids (March flies) and ceratopogonids (biting midge), also cause a nuisance and have caused severe allergic reactions in some people living and working in the region. Outbreaks of mosquito-borne diseases in the area include, Ross River vitus, Barmah Forest virus and the much rarer but potentially fatal Murray Valley encephalitis.	<u>Department of Health</u> • Onsite infrastructure and activities have the potential to create mosquito breeding habitat. • Management of mosquitoes will be an important OSH component for the Port B site. The program should include larval monitoring, control of adult mosquitoes, removal of breeding habitats • Appropriate design and location of Port infrastructure and workforce education. • Areas that pond water should be avoided. <u>Point Samson Community Association</u> • Many members of the community hold fears for their health because of pollution from Cape Lambert.	The proponent has committed to develop and implement a pest management program on advice from experts to monitor and control mosquitoes. Therefore **health is not considered a key environmental factor in this assessment.**
Community facilities and integration	A construction camp would be used during the construction phase. The proponent is considering options for staff accommodation during the operational phase. One of these options would involve an increased reliance on fly in fly out staff.	<u>Department of Health</u> An increased population associated with Port B will put pressure on health services. The PER doesn't consider the full range of health services in this regard. <u>Shire of Roebourne</u> The Fly in Fly out workforce provides little positive social benefit to the local area and should be minimised. <u>Point Samson Community Association</u> • Fly in Fly out workforces should be ruled out by Ministerial conditions. • The proponent should consider social dividends in the areas of impact.	This is not considered an environmental factor.

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
1. The precautionary principle		
Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. *In application of this precautionary principle, decisions should be guided by –* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* (b) *an assessment of the risk-weighted consequences of various options.*	Yes	In considering this principle, the EPA notes the following: • Investigations of the biological and physical environments provided background information to assess risks and identify measures to avoid or minimise impacts. • An assessment of the adequacy of these investigations and proposed management frameworks is provided in Section 3 of this report. • Conditions have been recommended where considered necessary.
2. The principle of intergenerational equity		
The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	Yes	In considering this principle, the EPA notes the following: • This proposals has a life that extends beyond that of one generation; • The export of iron ore provides income to invest in projects that will service future generations of Australians.
3. The principle of the conservation of biological diversity and ecological integrity		
Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	In considering this principle, the EPA notes the following: • Scientific studies have raised the level of understanding and contributed to the proposed management of impacts due to the construction and operation of Pilbara ports. • The above impacts have been assessed in Section 3 of this report. • The conservation and ecological values of Cape Lambert and surrounding terrestrial and marine environments are considered relevant environmental factors and are discussed in the body of this report.
4. Principles relating to improved valuation, pricing and incentive mechanisms		
(1) Environmental factors should be included in the valuation of assets and services. *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment,*	No	

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
avoidance and abatement. *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
5. The principle of waste minimisation		
All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Yes	In considering this principle, the EPA notes the following: • Other than greenhouse gases, the construction and operation of the Port B proposal does not incorporate significant quantities of waste materials; • As a large operator, the proponent will be required to participate in the proposed carbon trading scheme; • The proponent has developed procedures to manage both liquid and solid wastes in a lawful and responsible manner.

Appendix 4

Indentified Decision-Making Authorities
and
Recommended Environmental Conditions

Nominated Decision-Making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

Decision-making Authority	Approval
Department of Environment and Conservation	Works Approval and Licence (Part V *Environmental Protection Act 1986*).
Minister for Water	*Rights in Water and Irrigation Act 1914*- water abstraction licences.
Minister for Mines and Petroleum	*Mining Act 1978* approvals and the Transport, handling, use and storage of dangerous goods under the *Explosives and Dangerous Goods Act 1961*.
Department of Transport	Construction and operation of a port; *Jetties Act 1926* *Harbours and Jetties Act 1928* *Shipping and Pilotage Act 1967* *Marine and Harbours Act 1981* *Western Australian Marine Act 1982*
Minister for State Development	Approvals under the *Iron Ore (Robe River) Agreement Act 1964*.
Minister for Lands	Railways and land between high and low water marks, *Land Administration Act 1997*.
Minister for Indigenous Affairs	*Aboriginal Heritage Act* - s18 clearances.
Shire of Roebourne	Permits and development approvals

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
***ENVIRONMENTAL PROTECTION ACT 1986*)**

CAPE LAMBERT PORT B DEVELOPMENT – CONSTRUCTION OF SECOND PORT (PORT B)
SHIRE OF ROEBOURNE

Proposal: The proposal is to construct and operate a second port (Port B) at Cape Lambert to process and export up to 130 million tonnes of ore per annum.

Proponent: Pilbara Iron Pty Ltd

Proponent Address: Level 22, Central Park, 152 – 158 St George's Terrace, PERTH WA 6000

Assessment Number:

Report of the Environmental Protection Authority: Report 1351

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Implementation

1-1 The proponent shall implement the proposal as assessed by the Environmental Protection Authority and described in Schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3 Time Limit of Authorisation

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void within five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-2 The proponent shall provide the Chief Executive Officer of the Office of the Environmental Protection Authority with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 Compliance Reporting

4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-2 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority, the compliance assessment plan required by condition 4-1 at least six calendar months prior to the first Compliance Assessment Report required by condition 4-6 or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

1. the frequency of compliance reporting;

2. the approach and timing of compliance assessments;

3. the retention of compliance assessments;

4. reporting of potential non-compliance and corrective actions taken;

5. the table of contents of compliance reports; and

6. public availability of compliance reports.

4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-5 The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within two business days of that non-compliance being known.

4-6 The proponent shall submit its first Compliance Assessment Report within 15 months following the date of issue of this statement addressing the twelve-month period from the date of issue of this statement and then annually from the date of submission of the first Compliance Assessment Report.

The compliance assessment report shall:

1. be endorsed by the proponent's Managing Director or a person approved in writing by Chief Executive Officer of the Office of the Environmental Protection Authority, delegated to sign on the Managing Director's behalf;
2. include a statement as to whether the proponent has complied with the conditions;
3. identify all potential non-compliances and describe corrective and preventative actions taken;
4. be made publicly available in accordance with the approved compliance assessment plan; and
5. indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Fauna – Short Range Endemics

5-1 The proponent shall not clear or disturb:

1. the ground or any vegetation beyond the proposal footprint depicted in figure 1 and defined in Table 2 of this Statement;
2. more than a total combined area of 19.2 hectares of vegetation from those portions of the development footprint that extend over *Lerista nevinae* habitat as outlined in figure 1 and defined in Table 3 of this Statement.

5-2 The proponent shall not clear *Lerista nevinae* habitat; to access borrow, or for the purpose of laydown or storage, or for any purpose other than that essential for the construction of port infrastructure.

5-3 The proponent shall submit a ground disturbance report to the Chief Executive Officer of the Office of the Environmental Protection Authority to demonstrate ongoing compliance with conditions 5-1 and 5-2 above initially bi-monthly from the commencement of ground disturbing activities, during construction, and then annually during the operation of Cape Lambert Port B.

The report shall include:

1. a clear, top down (not oblique) aerial image captured at the end of each month from the commencement of ground disturbing activities and then annually during the operation of Cape Lambert Port B for those areas of *Lerista nevinae* habitat

within the proposal footprint depicted in figure 1 and defined in Table 3 of this Statement;

2. a spatial analysis that provides the actual total combined area of *Lerista nevinae* habitat disturbance.

5-4 The proponent shall, in consultation with the Department of Environment and Conservation, for the whole duration of the Cape Lambert Port B development project, actively manage *Lerista nevinae* habitat as defined by primary and secondary dune vegetation and outlined in figure 1, within the industrial lease area to ensure that its habitat value is maintained or enhanced. Active management shall include:

1. feral animal control;
2. the prohibition of stock;
3. weed control;
4. limited and controlled vehicle and pedestrian access through fencing and signage; and
5. the control of wild fires.

5-5 The proponent shall:

1. within six months of the first shipment of iron ore from Cape Lambert Port B, rehabilitate those areas of the footprint that were cleared during the construction phase but which are not required during the operational phase of the Cape Lambert Port B proposal; and
2. within five years of the cessation of port operations at Cape Lambert Port B, remove all marine and terrestrial infrastructure and rehabilitate all areas disturbed by the Cape Lambert Port B development.

All plant material used in rehabilitation is to be of local provenance, sourced from coastal plain and near coastal plain communities of the Roebourne Plain, south of Balla Balla and Whim Creek, and north of Cape Preston and the Fortescue River. The dominant species, general species composition, percentage cover and community structure in rehabilitated areas are to be comparable with suitable reference sites on nearby land which has not been disturbed by industrial development. Reference sites are to be chosen in consultation with the Department of Environment and Conservation.

6 Turtle Management

6-1 At all stages of the Cape Lambert Port B development proposal including construction, operations and decommissioning, the proponent shall ensure that, other than the area labelled ‘direct light’ on figure 3 and defined in Table 9 of this Statement, the whole of Bell’s Beach from the line labelled ‘beach boundary’ on figure 3 and defined in Table 8 up to, and including coastal vegetation within which turtle nesting occurs, is maintained in the shade at ground level and is not subject to direct light from Port infrastructure or activities during the turtle nesting and hatching seasons defined as 20 October to 10 March in any year.

6-2 The proponent shall implement the *Cape Lambert Port B Development Marine Turtle Management Plan* dated December 2008, and subsequent Cape Lambert Port B Turtle Management Plans prepared in consultation with the Department of Environment and Conservation and in accordance with the review procedures outlined in section seven of the *Cape Lambert Port B Development Marine Turtle Management Plan* dated December 2008.

6-3 The proponent shall make the Turtle Management Plan required by condition 6-2, and the results of monitoring programs outlined in the Turtle Management Plan, publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

6-4 The proponent shall establish, in consultation with the Chief Executive Officer of the Department of Environment and Conservation, protocols to detect, rescue and release adult and hatchling turtles that are or have been mis-orientated or disorientated by light spill.

6-5 The proponent shall report any mortality of marine turtles or other threatened or specially protected fauna to the Department of Environment and Conservation within 24 hours following detection.

7 Pile Driving

7-1 The proponent shall engage a dedicated Marine Fauna Observer or Observers who must:

1. demonstrate a knowledge and experience of marine wildlife species and their behaviours in the Pilbara region;
2. have the capacity, subject to safety considerations, to move independently between pile driving barges and within the exclusion zones surrounding piling operations;
3. be on duty during all daylight hours when pile-driving operations are conducted;
4. maintain a log of:
   - observed cetaceans in a format consistent with the National Cetacean Sightings and Strandings Database;
   - other marine fauna observations, including fish kills and wildlife injuries within 500m of piling operations;
   - fauna bahaviours, in particular any behaviours that could be attributed to piling activities;
   - management responses in relation to dead and injured wildlife, including the suspension of piling activities as required under condition 7-5; and
   - observation effort in relation to piling activities.

7-2 The proponent shall:

1. make available, on request from the Office of the Environmental Protection Authority, the log prepared by the Marine Fauna Observer or observers, required under condition 7-1 ;
2. within six months of completing pile driving operations for Cape Lambert Port B, lodge cetacean records with the National Cetacean Sighting and Strandings Database at the Australian Antarctic Division.

7-3 No pile driving shall commence during daylight hours between sunrise and sunset, until the designated Marine Fauna Observer or observers required by condition 7-1 have verified that no whales or marine turtles have been observed within an area 500 metres from the planned piling operation during the 15 minute period immediately prior to commencement.

7-4 Prior to commencement of full power pile driving, the proponent shall implement soft start-up procedures that slowly increase the intensity of noise emissions over a period of no less than 15 minutes.

7-5 If the Marine Fauna Observer or observers required by condition 7-1, or any other person, should observe a whale or turtle enter within 100 metres of a single piling operation, or 150 metres of each concurrent piling operation, the piling operation within that distance from the whale or turtle is to be suspended.

7-6 Pile driving that has been suspended in accordance with condition 7-5 shall not recommence until all whales and turtles have moved beyond 500 metres from the suspended piling operation and beyond 150 metres of all concurrently operating pile-driving operations. Pile driving that has been suspended for more than 15 minutes shall recommence with soft start-up procedures as required by condition 7-4.

7-7 No pile-driving shall occur between the hours of sunset and sunrise during:

1. the turtle nesting season defined as 20 October to 10 March in any year;
2. the peak southern migration of mother and calf humpback whale pods defined as 15 September to 10 October in any year.

7-8 The proponent shall, to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, design and implement, in partnership with an expert or experts in the field of noise propagation modelling in the marine environment, an underwater noise monitoring program during the Cape Lambert Port B pile driving operation to:

1. measure underwater noise from pile driving operations to establish a library of sound signals:
   - at varying distances from the noise source;
   - when driving piles of different sizes and types;

- during the concurrent piling of different numbers of piles;
- in conditions of different water depths;

2. review the predictive capacity of the noise propagation model used for Cape Lambert Port B and make recommendations for improving the accuracy of underwater noise modelling in the future.

The results of the noise monitoring and modelling review are to be published within three years after the completion of the Cape Lambert Port B pile driving operation in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority. .

8 Marine Dredging

The terms 'benthic primary producers', 'benthic primary producer communities' and 'benthic primary producer habitats' used in this condition are defined in EPA Environmental Assessment Guideline Number 3; *Protection Of Benthic Primary Producer Habitats In Western Australia's Marine Environment* (EAG3).

8-1 The proponent shall ensure that the implementation of the proposal does not cause a permanent loss of Benthic Primary Producer Habitat in excess of 0.7 hectares. Benthic Primary Producer Habitat is shown on figure 4.

Note: 'Permanent loss' is defined as the mortality of, or long-term serious damage to, Benthic Primary Producer Habitat.

8-2 Prior to the commencement of dredging, the proponent shall establish a monitoring program to monitor water quality and coral health. The monitoring program shall include:

- the collection and analysis of water quality and coral health monitoring data including turbidity (NTU), temperature (°C), light (μmol.m^2/day), gross sedimentation rates (mg.cm^2/day), particle size distribution and coral health;

- monitoring is to be undertaken at sites at sites 1 to 15 in Table 6 plus an additional site or sites on the benthic primary producer habitat east of Bezout Island / Bezout Rock at a location or locations no more than 300 metres beyond the predicted boundary of the worst case scenario impact zone as depicted in figure 4 and defined in Table 6, and

- a monitoring frequency of two weeks at all monitoring sites other than 'contingency reference' monitoring sites;

This program shall be designed to allow net coral mortality at any indicator site to be calculated with a statistical power of 0.8 or greater.

8-3 Prior to the commencement of dredging the proponent shall implement the monitoring program required by condition 8-2 to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

8-4 The proponent shall ensure that net coral loss at any 'indicator' site listed in Table 6 or at the additional site or sites on the eastern side of Bezout Island / Bezout Rock is less than 5 percent.

8-5 The proponent shall monitor water quality and coral health for the duration of the dredging and/or spoil disposal activities and for at least two months after cessation of all dredging and spoil disposal activities.

8-6 In the event that monitoring required by conditions 8-3 and 8-5 indicates that the coral criterion in condition 8-4 is not being met at any indicator site, or that the proponent is unable to undertake coral health monitoring during dredging, the proponent shall:

a) immediately cease dredging activities that could contribute to the decline in coral health at the affected 'indicator site'(s); and

b) report such findings including evidence which allows the determination of the cause of the decline in coral health.

The proponent shall report the above to the Chief Executive Officer of the Office of the Environmental Protection Authority within 4 days of the decline in coral health being identified.

8-7 The proponent shall not recommence dredging and/or spoil disposal activities following any cessation required under condition 8-6 until it can be demonstrated to the requirements of the Chief Executive Officer of the office of the Environmental Protection Authority that the recommencement of such activities will not contribute to further net mortality of corals at sites where non compliant levels of net coral loss have occurred.

8-8 The proponent shall not conduct any dredging and/or spoil disposal activities or drilling and blasting activity during the period 3 days prior to the predicted commencement of mass coral spawning or as soon as mass coral spawning is detected if prior to that predicted time, and dredging and spoil disposal activities are to remain suspended for seven days from the commencement of mass coral spawning.

8-9 At 6 months and 18 months from completion of construction the proponent shall report to the Chief Executive Officer of the Office of the Environmental Protection Authority the permanent loss of Benthic Primary Producer Habitat and any loss of Benthic Primary Producer Communities within the six local assessment units shown on figure 4.

The reports shall include co-ordinates and a map showing the areas of loss of Benthic Primary Producer Habitat and Benthic Primary Producer Communities caused by the proposal and the results of water quality monitoring correlated with Coral health.

9 Non-Indigenous Marine Species

9-1 The proponent shall ensure that all non-trading vessels and associated immersible equipment, that are either owned by the proponent, or contracted for construction, maintenance, port operations or decommissioning of the Cape Lambert Port B proposal, (including dredges and pile driving barges) are appropriately cleaned, maintained and inspected by a Department of Fisheries Officer or a suitably qualified marine pest expert approved by the Department of Fisheries, and provide evidence to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Fisheries, certifying that:

1. there is no sediment on or within the non-trading vessel and equipment; and
2. ballast water (if any) has been, or will be, managed according to the Australian Quarantine Inspection Service ballast water requirements; and
3. all non-indigenous marine species with the potential to impact environmental or economic values in Western Australian waters have been successfully treated or removed from the vessel or associated immersible equipment,

Vessel and immersible equipment inspections shall be conducted either;

(a) immediately (no more than 48 hours) prior to departure for Cape Lambert Port B; or

(b) within 48 hours following arrival within Port Walcott; and

vessels that have spent more than seven days in coastal waters (less than 50 meters depth) between inspection and their arrival at Port Walcott shall be inspected during the fourth week after arrival in Port Walcott.

9-2 Specified vessels and equipment will be exempt from the non-indigenous species risk mitigation measures referred to in condition 9-1 if, prior to arriving at Port Walcott, the Chief Executive Officer of the office of the Environmental Protection Authority, on advice from the Department of Fisheries, has issued a written exemption for that specified vessel and equipment to enter Port Walcott on that date, based on comprehensive information submitted by the proponent that includes a risk assessment supported by documentation demonstrating biofouling management measures and a vessel activity profile since the most recent dry-dock cleaning.

9-3 If, non-trading vessels and associated immersible equipment are to be transferred from Cape Lambert to other locations within Western Australia's territorial waters, the proponent shall, at least two weeks prior to departure from Port Walcott, submit a demobilisation risk assessment to the Department of Fisheries that is informed by non-indigenous marine species monitoring of Cape Lambert Port B. Non-indigenous marine species monitoring shall:

1. be consistent with monitoring design, implementation and reporting standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, as approved by the Monitoring Design Assessment Panel of the National Introduced Marine Pest Coordinating Group;

2. include a review of target priority species prior to each monitoring survey;
3. include a range of sample sites focusing on habitats considered most capable of facilitating the establishment of priority target species throughout all areas of port activities including anchorages, wharves, jetties, slipways, harbours and natural substrates;
4. be undertaken a minimum of every three years for the life of the project;

include opportunistic sampling and analysis of specimens removed during port and vessel maintenance activities.

9-4 The proponent shall, throughout the life of the project notify the Chief Executive Officer of the Office of the Environmental Protection Authority and the Department of Fisheries of any non-indigenous marine species detected in the waters at or adjacent to Cape Lambert within 24 hours following detection;

9-5 In the event that any non-indigenous marine species are detected during either the inspection of vessels and equipment, or during monitoring surveys, the proponent shall, in consultation with the Chief Executive Officer of the Office of the Environmental Protection Authority and the Department of Fisheries develop and implement an agreed Non-Indigenous Marine Species Management Strategy to prevent wherever practicable, the establishment and proliferation of that organism, to control and eradicate that organism, and to minimize the risk of that the organism being transferred to other locations within Western Australia.

For the purpose of condition 9, the term 'non-trading vessel' refers to those vessels included in the definition of non-trading vessels outlined in the *National System for the Prevention and Management of Marine Pest Incursions, National Biofouling Management Guidance for Non-Trading Vessels.*

10 Dust

10-1 Prior to commissioning, the proponent shall update the *Dust Management Plan – 2009 Cape Lambert Port Operations, December 2008* to include Cape Lambert Port B to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation.

10-2 The Dust Management Plan shall describe the process for defining and reviewing criteria for determining when port construction or operation is significantly contributing to ambient dust levels at Point Samson and Wickham, in consultation with the Department of Environment and Conservation.

10-3 The proponent shall implement the Dust Management Plan required by condition 10-1.

10-4 The proponent shall make the Dust Management Plan required by condition 10-1 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

11 Drilling and Blasting Activities

11-1 Prior to commencing drilling and blasting activities, the proponent shall, in consultation with:

- Department of Environment and Conservation;
- Department of Transport (Maritime Division);
- Department of Fisheries; and
- Commonwealth Department of the Environment, Water, Heritage and the Arts,

prepare to the requirements of the Chief Executive Officer of the Office of Environmental Protection Authority, a Drilling and Blasting Management Plan (D&BMP). The objectives of the D&BMP are to ensure that drilling and blasting activities are managed to minimise adverse impacts on marine vertebrate species.

The D&BMP shall include:

- an assessment of the amount of drilling and blasting required and over what area;
- an assessment of likely blast pressures and potential environmental impacts of these pressures;
- management actions and procedures to minimise environmental impacts, including the disposal of drilling muds and consideration of ecological windows between seasonally sensitive periods for marine wildlife;
- a description of how dead and injured wildlife are to be managed;
- stakeholder communication; and
- reporting procedures and time frames.

11-2 In the event that drilling and blasting is required, the proponent shall implement the D&BMP required under condition 11-1.

11-3 The proponent shall make the Plan required under condition 11-1 publically available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

11-4 No dredging, drilling or blasting activities are to be conducted outside the 320 hectare area illustrated in figure 2 and bounded by the coordinates listed in Table 4 of this Statement.

11-5 The disposal of dredge material is not to take place in Western Australian State Waters outside the two square kilometre area bounded by the coordinates listed in Table 5.

Procedures

1. Where a condition states "on advice of the Environmental Protection Authority", the Office of the Environmental Protection Authority will provide that advice to the proponent.

2. The Office of the Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the proponent.

3. The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or Office of the Environmental Protection Authority over the fulfilment of the requirements of the conditions.

4. The proponent is required to apply for a Works Approval Licence for this project under the provision of Part V of the *Environmental Protection Act 1986*.

Schedule 1
The Proposal (Assessment No.1717)

General Description
The proposal is for the construction and operation of a second port (Port B) at Cape Lambert to process and export up to 130 million tonnes of ore per annum (Mtpa).

The upgrade works are described in the following document:
Cape Lambert Port B development – Public Environmental Review and draft Public Environmental Report, March 2009. Prepared for Rio Tinto Pty Ltd by Sinclair Knight Merz (17 March 2009).
Cape Lambert Port B Development – Environmental Assessment of the Wharf relocation, November 2009. Prepared for Rio Tinto Pty Ltd by Sinclair Knight Merz (27 November 2009).

Summary Description
a summary of the key proposal characteristics is presented in Table 1.

Table 1 – Summary of key characteristics of the Port B proposal

Element	Description
Life of project	At least 50 years
Iron ore throughput capacity	Up to 130 Mtpa
Stockyard capacity	Storage to accommodate up to 130 Mtpa
Total footprint of land-based activities	340 ha
Total area of vegetation clearing within the footprint	300 ha
Dredging: volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension; area of seabed to be dredged; dredging depths; - berth pockets - approach/departure channel - turning basins duration of dredging program.	 Up to 14 Mm^3 Up to 320 ha -20 metres Chart Datum -16 metres Chart Datum -10 metres Chart Datum Approximately 52 weeks
Dredge disposal: number of spoil grounds in State waters; dimensions of spoil ground; volume of dredge spoil to be disposed of in Western Australian State Waters; amount of dredge spoil to be disposed of on shore	 1 2 km long by 1 km wide. 6.06 Mm^3 0 Mm^3

Element	Description
Duration of pile driving operation	Approximately 52 weeks
Access jetty and wharf : design length number of ship loading berths	 Open trellis design allowing water flow beneath Up to 2.2 km (from conveyor junction on land to end of wharf) Up to 4
Major plant components: car dumpers screenhouses (lump rescreening plants) sample stations/systems stackers reclaimers shiploaders	 3 2 2 3 or 4 3 2

Abbreviations

Mtpa million tonnes per annum
ha hectares
Mm^3 million cubic metres
km kilometre

Attachments

Figures (See figures in main body of report above)

Figure 1 Terrestrial component of proposal footprint with *Lerista nevinae* habitat
Figure 2 Marine component of proposal footprint.
Figure 3 Bell's Beach light spill
Figure 4 Predicted dredging impacts and monitoring sites

Tables

Table 1 Coordinates of terrestrial footprint
Table 2 Coordinates of potential impact areas in *Lerista nevinae* habitat
Table 3 Coordinates of dredging footprint
Table 4 Coordinates of Western Australian State waters spoil disposal site.
Table 5 Coordinates of dredging impact monitoring sites
Table 6 Boundary coordinates of predicted worst case dredging impacts
Table 7 Seaward boundary coordinates of shaded area on Bell's Beach
Table 8 Coordinates of area of direct light at Bell's Beach.

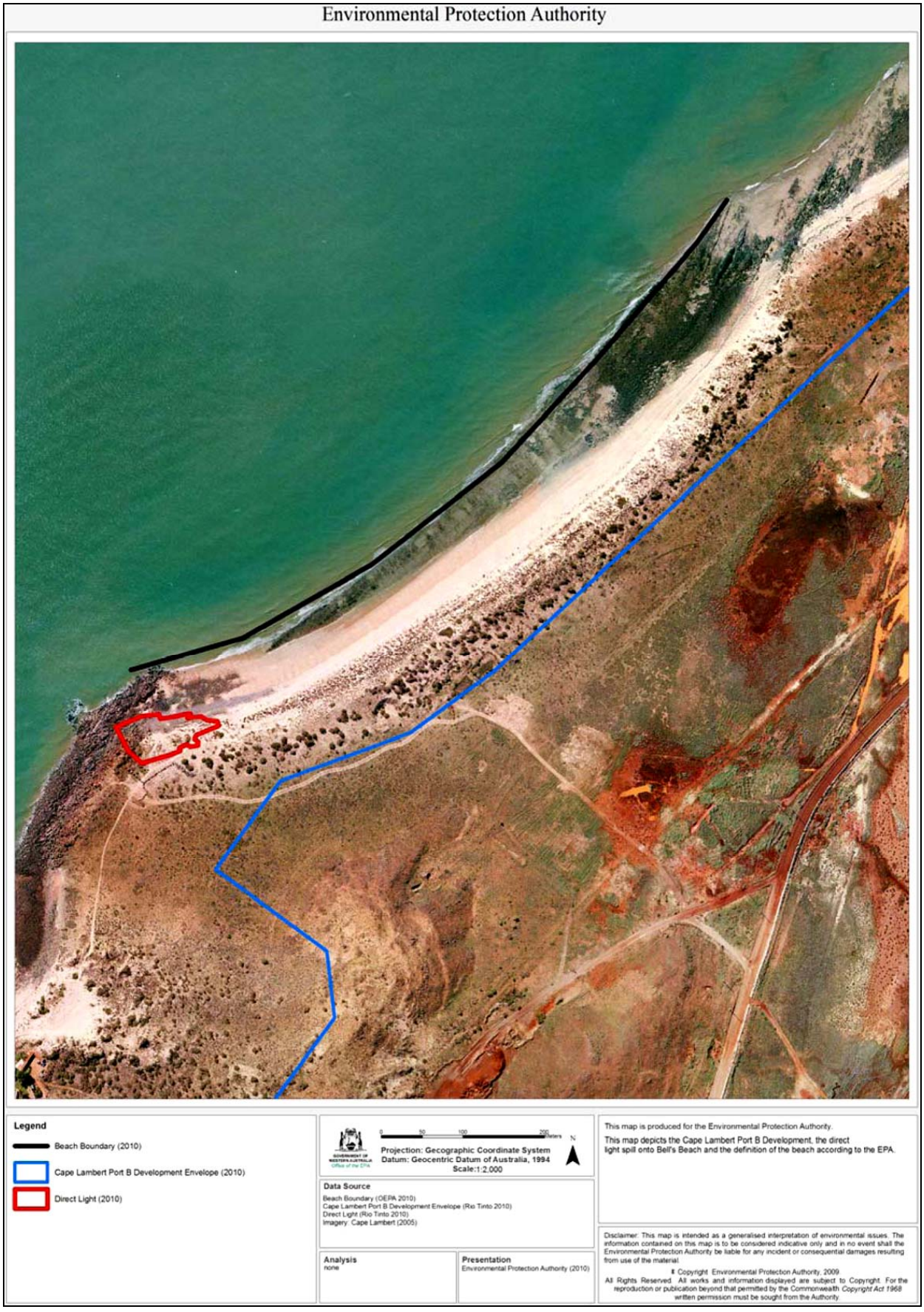

Figure 3: Bell's Beach light spill

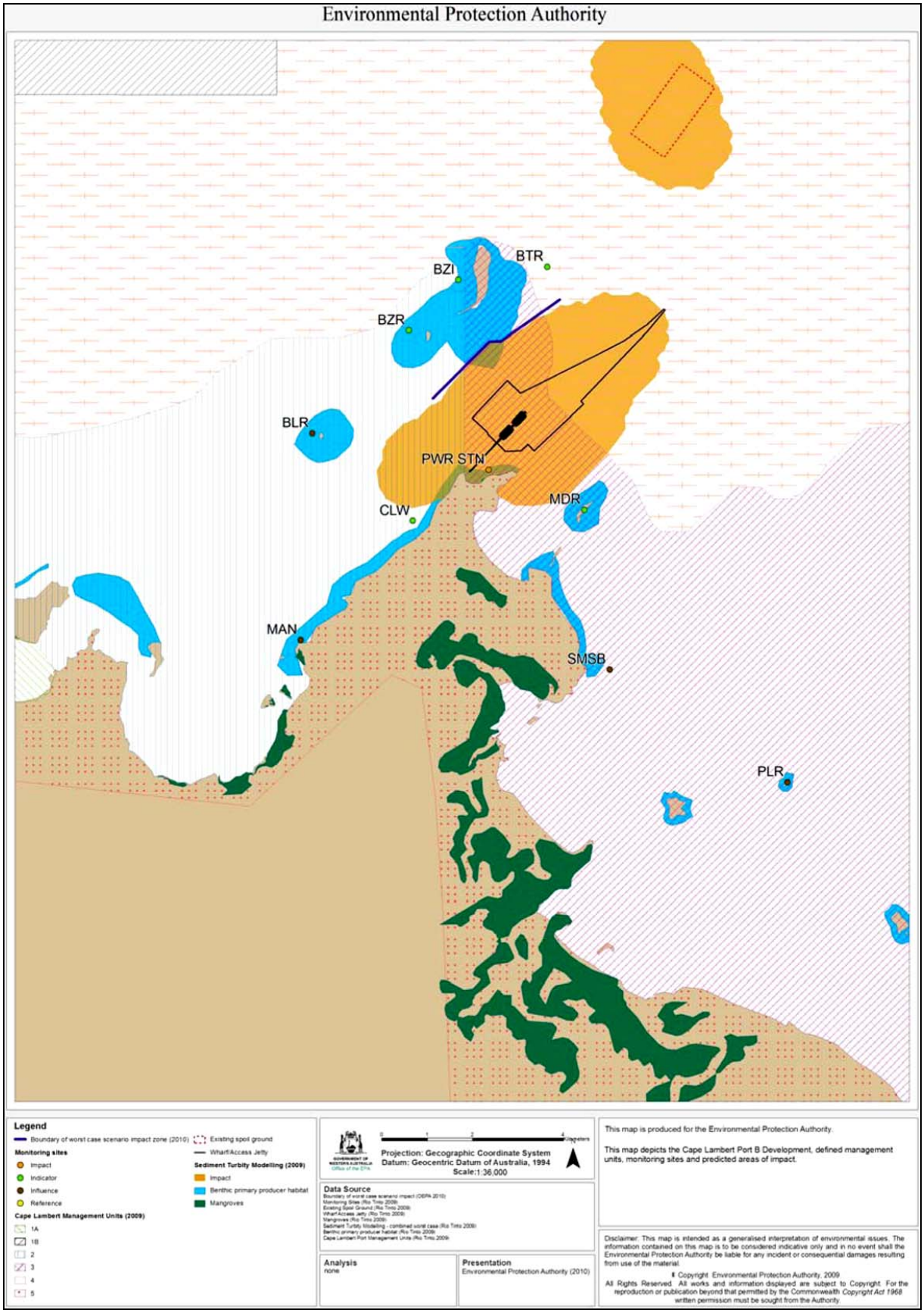

Figure 4: ***Predicted dredging impacts and monitoring sites***

Table 1 **Coordinates of terrestrial footprint**

Easting	Northing
518063	7722744
518056	7722736
518037	7722691
518223	7722610
518248	7722565
518195	7722537
518090	7722468
517904	7722309
517858	7722254
517771	7722125
517650	7721875
517610	7721767
517283	7721100
517261	7721054
517340	7721054
517350	7720945
517254	7720835
517181	7720855
516888	7720466
516952	7720428
516962	7720378
516906	7720059
516870	7720025
516797	7720025
516657	7720117
516304	7719578
516231	7719462
514996	7717800
514884	7717554
514817	7717274
514920	7717170
514752	7717002
514681	7716707
514557	7716519
514659	7716232
514601	7716212
514549	7716270
514536	7716279
514416	7716305

Easting	Northing
513211	7714469
512996	7714608
513125	7714807
512962	7714997
513175	7715333
513505	7715369
514082	7716157
514188	7716567
514140	7716607
514122	7716622
514107	7716637
514078	7716671
514074	7716691
514076	7716711
514087	7716741
514156	7716818
514172	7716853
514191	7716887
514219	7716927
514352	7717197
514409	7717414
514407	7717457
514406	7717497
514399	7717562
514400	7717601
514406	7717641
514425	7717705
514457	7717807
514480	7717887
514715	7718096
514786	7718227
514794	7718308
514797	7718339
514793	7718371
514782	7718393
514731	7718360
514666	7718316
514641	7718301
514626	7718326

Easting	Northing
514655	7718343
514694	7718365
514711	7718384
514722	7718410
514729	7718466
514705	7718511
514671	7718580
514655	7718619
514662	7718690
514671	7718729
514689	7718767
514909	7719067
514891	7719156
514807	7719287
514951	7719484
515153	7719446
515279	7719469
515523	7719690
515619	7719834
515672	7719983
515646	7719997
515602	7720010
515582	7720030
515590	7720056
515613	7720052
515622	7720065
515668	7720054
515753	7720008
515919	7720234
515909	7720317
515773	7720417
515853	7720526
516013	7720585
516114	7720660
516647	7721154
516785	7721195
517044	7721309
517101	7721385
517134	7721488

Easting	Northing
517237	7721544
517334	7721785
517438	7722032
517543	7722282
517666	7722348
517676	7722359
517693	7722377
517724	7722431
517691	7722451
517741	7722532
517711	7722535
517714	7722541
517773	7722614
517767	7722632
517757	7722658
517758	7722684
517766	7722690
517774	7722686
517784	7722668
517790	7722660
517808	7722657
517810	7722666
517829	7722692
517828	7722709
517818	7722709
517791	7722710
517790	7722719
517799	7722758
517795	7722776
517797	7722786
517827	7722805
517844	7722836
517868	7722866
517946	7722965
517967	7722998
517984	7723003
517993	7723002
518008	7722985
518010	7722976
517999	7722947

Easting	Northing
518003	7722939
518012	7722946
518025	7722965
518033	7722969
518067	7722970
518075	7722966
518082	7722958
518087	7722924
518085	7722905
518059	7722863
518043	7722835
518018	7722805
518015	7722785
518028	7722768
518046	7722759
518063	7722744

Table 2 Coordinates of potential impact areas in *Lerista nevinae* habitat

Polygon intersection number- corresponds with map	Easting	Northing
1	513614	7715517
1	513635	7715521
1	513666	7715537
1	513701	7715552
1	513727	7715571
1	513754	7715596
1	513815	7715625
1	513856	7715664
1	513891	7715699
1	513910	7715922
1	513913	7715736
1	513923	7715906
1	513935	7715880
1	513935	7715854
1	513940	7715804
1	513940	7715804
2	514087	7716741
2	514129	7716788
2	514156	7716818
2	514156	7716818
3	514426	7717660
3	514430	7717625
3	514431	7717703
3	514434	7717732
3	514442	7717622
3	514457	7717807
3	514469	7717634
3	514480	7717887
3	514489	7717659
3	514493	7717734
3	514495	7717791
3	514502	7717689
3	514523	7717862
3	514558	7717919
3	514599	7717973
3	514615	7717986
3	514625	7717999
3	514630	7718020
3	514630	7718020
4	514718	7718102
4	514727	7718112
4	514740	7718142
4	514742	7718137
4	514742	7718137

Polygon intersection number- corresponds with map	Easting	Northing
5	514707	7718089
5	514707	7718089
5	514708	7718090
5	514708	7718090
6	514645	7718337
6	514645	7718324
6	514647	7718312
6	514655	7718343
6	514658	7718312
6	514669	7718322
6	514669	7718351
6	514671	7718348
6	514675	7718334
6	514675	7718334
7	514700	7718372
7	514707	7718379
7	514709	7718374
7	514709	7718374
8	514655	7718619
8	514662	7718690
8	514671	7718580
8	514671	7718729
8	514689	7718767
8	514705	7718511
8	514710	7718502
8	514710	7718506
8	514710	7718508
8	514722	7718411
8	514722	7718529
8	514725	7718413
8	514728	7718817
8	514728	7718821
8	514728	7718498
8	514729	7718466
8	514730	7718434
8	514730	7718811
8	514730	7718462
8	514734	7718490
8	514746	7718555
8	514747	7718792
8	514766	7718594
8	514774	7718598
8	514784	7718764
8	514788	7718594
8	514797	7718598
8	514797	7718622

Polygon intersection number- corresponds with map	Easting	Northing
8	514797	7718634
8	514799	7718605
8	514805	7718747
8	514807	7718668
8	514826	7718698
8	514828	7718728
8	514829	7718715
8	514829	7718715
9	514750	7718851
9	514770	7718846
9	514774	7718851
9	514775	7718866
9	514781	7718872
9	514792	7718872
9	514808	7718868
9	514826	7718844
9	514857	7718991
9	514858	7718998
9	514859	7718970
9	514864	7718823
9	514884	7718943
9	514891	7718823
9	514902	7718924
9	514914	7718904
9	514930	7718840
9	514933	7718897
9	514936	7718875
9	514937	7718890
9	514937	7718890
10	515298	7719486
10	515312	7719490
10	515404	7719490
10	515466	7719510
10	515523	7719690
10	515549	7719528
10	515555	7719531
10	515578	7719553
10	515582	7720030
10	515585	7720038
10	515591	7720035
10	515592	7719560
10	515602	7720010
10	515613	7719567
10	515619	7719834
10	515625	7719563
10	515629	7720028

Polygon intersection number- corresponds with map	Easting	Northing
10	515646	7719997
10	515657	7719575
10	515671	7719591
10	515673	7719983
10	515674	7720012
10	515688	7719608
10	515714	7719616
10	515716	7719988
10	515752	7719968
10	515764	7719635
10	515784	7719952
10	515803	7719652
10	515813	7719934
10	515829	7719918
10	515841	7719690
10	515846	7719888
10	515860	7719851
10	515865	7719721
10	515867	7719731
10	515869	7719826
10	515872	7719797
10	515872	7719797
11	515589	7720051
11	515590	7720056
11	515599	7720046
11	515613	7720052
11	515622	7720065
11	515623	7720041
11	515650	7720035
11	515668	7720054
11	515675	7720025
11	515723	7719996
11	515753	7720008
11	515774	7719970
11	515797	7720047
11	515798	7720059
11	515799	7720023
11	515801	7720005
11	515803	7720067
11	515807	7720000
11	515815	7719945
11	515816	7720074
11	515831	7719933
11	515837	7719996
11	515840	7720099
11	515846	7719950

Polygon intersection number- corresponds with map	Easting	Northing
11	515848	7719914
11	515850	7720123
11	515851	7719935
11	515853	7719970
11	515856	7719996
11	515857	7720137
11	515866	7719982
11	515866	7719992
11	515867	7719863
11	515869	7719916
11	515870	7720155
11	515874	7719856
11	515879	7720176
11	515879	7720177
11	515884	7720186
11	515892	7719857
11	515898	7719888
11	515901	7719878
11	515901	7719878

Table 3 Coordinates of dredging footprint

Large dredge area

Easting	Northing
520600	7724434
519582	7723470
519445	7723619
519294	7723477
518953	7723457
518563	7723837
518561	7723871
518214	7724194
518747	7724765
519231	7724720
520994	7725604
521556	7725896
522061	7726246
522452	7726605
522479	7726580
522092	7726119
521360	7725348
520431	7724612
520600	7724434

Small dredge area

Easting	Northing
517085	7723000
517391	7723061
517403	7723083
517601	7723084
517736	7723072
517741	7722935
517827	7722886
517741	7722725
517564	7722786
517269	7722789
517163	7722868
517085	7723000

Table 4 Coordinates of Western Australian State waters spoil disposal site

Coordinates	
Easting	Northing
522842	7732018
523570	7731490
522453	7729953
521725	7730481

Table 5 Coordinates of dredging impact monitoring sites

Site number	**Site name**	**site category**	**Site location**	
			latitude	**longitude**
1	Nearshore west	impact	20° 35.440’S	117° 10.685’E
2	Boat Rock	Indicator	20° 33.750’S	117° 10.621’E
3	Bezout Island	Indicator	20° 33.213’S	117° 10.311’E
4	Bezout Rock	Indicator	20° 33.823’S	117° 09.682’E
5	Cape Lambert West	Indicator	20° 36.090’S	117° 09.756’E
6	Middle Reef	indicator	20° 35.817’S	117° 11.862’E
7	Bells Reef	influence	20° 35.052’S	117° 08.456’E
8	Dixon Island East	influence	20° 37.084’S	117° 04.143’E
9	Mangrove point	influence	20° 37.555’S	117° 07.988’E
10	Pelican Rock	influence	20° 39.249’S	117° 14.415’E
11	Samson Beach	influence	20° 37.337’S	117° 11.890’E
12	Delambre Island	reference	20° 27.736’S	117° 03.916’E
13	Hat Rock	reference	20° 40.105’S	117° 17.136’E
14	Depuch Island	Contingency reference	20° 36’52.40”S	117° 42’29.09”E
15	Dolphin Island	Contingency reference	20° 25’811”S	116° 53.011”E

Table 6 Boundary coordinates of predicted worst case dredging impacts

Easting	Northing
517352	7724632
518593	7725884
518858	7725901
520146	7726812

Table 7 Seaward boundary coordinates of shaded area on Bell's Beach

Easting	Northing
515669	7720662
515806	7720702
515965	7720793
516124	7720918
516241	7721045
516363	7721187
516400	7721241

Table 8 Coordinates of area of direct light at Bell's Beach.

Easting	Northing
515651	7720592
515683	7720605
515703	7720607
515705	7720602
515721	7720604
515736	7720608
515742	7720608
515742	7720606
515738	7720603
515747	7720604
515755	7720605
515762	7720600
515775	7720599
515777	7720593
515749	7720582
515747	7720577
515751	7720574
515751	7720570
515742	7720568
515737	7720571
515728	7720567
515729	7720563
515717	7720558
515682	7720547
515666	7720562
515651	7720592

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions