

DECEMBER 2008

PORT OPERATIONS



PORT HEDLAND OUTER HARBOUR DEVELOPMENT

Environmental Scoping Document

IRON ORE


bhpbilliton

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1 EXECUTIVE SUMMARY

In response to forecast increase in global iron ore demand, BHP Billiton Iron Ore (BHPBIO) proposes to develop an Outer Harbour adjacent to the existing operations in Port Hedland. The key characteristics of this proposal are outlined in Table ES-1.

Table ES-1 Indicative Key Characteristics Table

Element	Description
General	
Proponent	BHP Billiton Iron Ore.
Proposal Description	Development of rail, processing, stockpiling and shiploading facilities at Port Hedland. Infrastructure comprises of jetty, wharf and shipping channel offshore of Finucane Island with onshore infrastructure including ore transport (rail) and handling infrastructure (car dumpers, stockyards and conveyor system).
Project Location	Port Hedland.
Export Capacity	Approximately 200 to 240 million tonnes per annum (Mtpa).
Construction Period	Approximately 4 Years.
Marine Infrastructure	
Wharf	2 kilometre (km) in length. Comprises eight berths, four shiploaders, shiploader rail system, access roadway and walkways, maintenance bays and conveyor system.
Vessel Sizes	Between 180,000 to 320,000 deadweight tonnes (DWT).
Jetty	Up to 6 km in length.
Shipping Channel	Approximately 34 km in length.
Dredge Material	Volume: Between 41 to 65 million cubic metres (Mm ³). Disposal: Offshore spoil grounds in Commonwealth waters, potential for some disposal of dredge spoil to land for reuse as fill.
Landside Infrastructure	
Infrastructure Corridor	Width ranges between 80 – 110 m; maximum width up to 140 m on Finucane Island. Includes access roadway, four conveyors up to 8 km in length, power, water and communication utilities. Height at head pulley – approximately 16 m above ground level. General height along conveyor – 1-2 m above ground level. Height at tail – approximately 10 m above ground level.
Stockyards	Four modules each with nominal 60 Mtpa capacity. Each module comprises five 200,000 t live stockpiles, a car dumper, stacker and reclaimer. A lump rescreening plant will be shared between two modules. A rescreened fines yard will be shared between four modules.
Rail	Loop – approximately 10 km in length. One rail loop for each module. Spur – approximately 30 km in length. Double tracked.
Footprint	
Vegetation Clearing	Area already cleared: Approximately 100 hectares (ha) (previously disturbed due to the HBI Plant and associated infrastructure). Area to be cleared: Approximately 600 to 1000 ha.

PORT HEDLAND OUTER HARBOUR DEVELOPMENT

Element	Description
Inputs	
Power	Power demand between 75 to 85 megawatts (MW). Supplied by third party.
Water	Water demand between 4 to 5 gegalitres per annum (GL/a). Supplied by third party.

A total of five alternative port locations were considered within the Pilbara region. These options were evaluated on a number of broad criteria ranging from environmental, social and economic. The Outer Harbour Development on Finucane Island was chosen as the preferred option.

The purpose of this Environmental Scoping Document is to highlight the key environmental factors relevant to the Outer Harbour Development at full capacity and the proposed scope of environmental investigations to address the potential environmental impacts. In addition it describes the content of the Public Environmental Review (PER)/ Environmental Impact Statement (EIS) to satisfy State Environmental Protection Authority (EPA) and Commonwealth Department of Environment, Water Heritage and the Arts (DEWHA) requirements for a coordinated assessment.

The environmental and social factors associated with the Outer Harbour Development have been identified through existing information, environmental investigations and stakeholder engagement. A preliminary impact assessment has been completed to categorise those factors being of high, medium and lower significance (Table ES-2). This scoping document provides details of the proposed studies for the high and medium factors.

Overarching principles have been considered within the context of the proposal and have been incorporated into the various environmental factors. The overarching principles include:

- Biodiversity;
- Sustainability; and
- Cumulative Impacts.

Table ES-2 Environmental Factors

High	Medium	Low
Terrestrial Flora and Vegetation	Geology, Soils and Landforms	Decommissioning
Terrestrial Fauna	Subterranean Fauna	Hydrocarbon and Hazardous Materials
Terrestrial Noise and Vibration	Surface Water Flows	
Protected Marine Biota	Intertidal and Subtidal Benthic Primary Producer Habitat (BPPH)	
Air Quality – Dust	Hydrodynamics and Coastal Processes	
Marine Water and Sediment Quality	Non-Endemic Marine Species	
Marine Noise, Blasting and Vibration	Air Quality – GHG	
Light	Ground Water and Surface Water Quality	
Aboriginal Heritage	Solid and Liquid Waste Disposal	
Social Impacts	Fisheries	
	Visual Amenity	
	European Heritage	
	Recreation	

This document provides an overview of the proposed Outer Harbour Development and outlines the potential mitigation strategies and management mechanisms for the outlined environmental factors, along with the relevant guidelines to support these management mechanisms.

2 INTRODUCTION

2.1 BACKGROUND

BHP Billiton Iron Ore (BHPBIO) is one of Australia's largest iron ore producers with mine, rail and port operations located in the Pilbara region of Western Australia (Figure 2-1).

BHPBIO exports its products to steelmakers in Japan, Korea, Taiwan, China, Europe and Australia through Port Hedland, which is one of the busiest commodity ports in the world.

BHPBIO's current port operations consist of processing, stockpiling and shiploading facilities at Nelson Point and Finucane Island (referred to as the Inner Harbour), located on opposite sides of the Port Hedland Harbour (Figure 2-2).

BHPBIO is in a phase of significant growth and has been focused on growing the business via a phased approach to meet market demand. This has been, and continues to be, achieved by a series of Rapid Growth Projects which enable BHPBIO's capacity to be increased incrementally (i.e. Rapid Growth Projects 1, 2, 3 and 4).

BHPBIO's expansion program will continue to grow with market demand for iron ore, which is expected to remain strong for some time as China continues its industrialisation phase. This growth will also have a flow-on effect to other steel producers in the Asian region and will underpin the current and proposed expansion activities.

To meet the expected demand in iron ore, BHPBIO is embarking on a development program to achieve a target of 300 million tonnes per annum (Mtpa) of installed capacity by 2015 at its Western Australia Iron Ore operations.

Maximising the output from the Inner Harbour is an essential step in this program and the feasibility of additional iron ore loading and berthing facilities within the Port Hedland Inner Harbour is currently being undertaken as part of Rapid Growth Project 5.

Further development within the Inner Harbour will not fully support the Company's growth plans and as such there is a requirement for BHPBIO to progress development options for new port facilities (i.e. the 'Outer Harbour Development').

The Outer Harbour Development will be located adjacent to BHPBIO's operations at Port Hedland and includes the construction of stockyards within the vicinity of the decommissioned Hot Briquetted Iron (HBI) plant at Boodarie and a jetty/wharf structure offshore from Finucane Island.

In pursuing ongoing growth plans, BHPBIO is committed to working with our local communities to support sustainable development in the region and ensure their needs are incorporated into growth plans.

FIGURE 1
PORT HEDLAND OUTER HARBOUR DEVELOPMENT
BHPBIO Existing Pilbara Operations

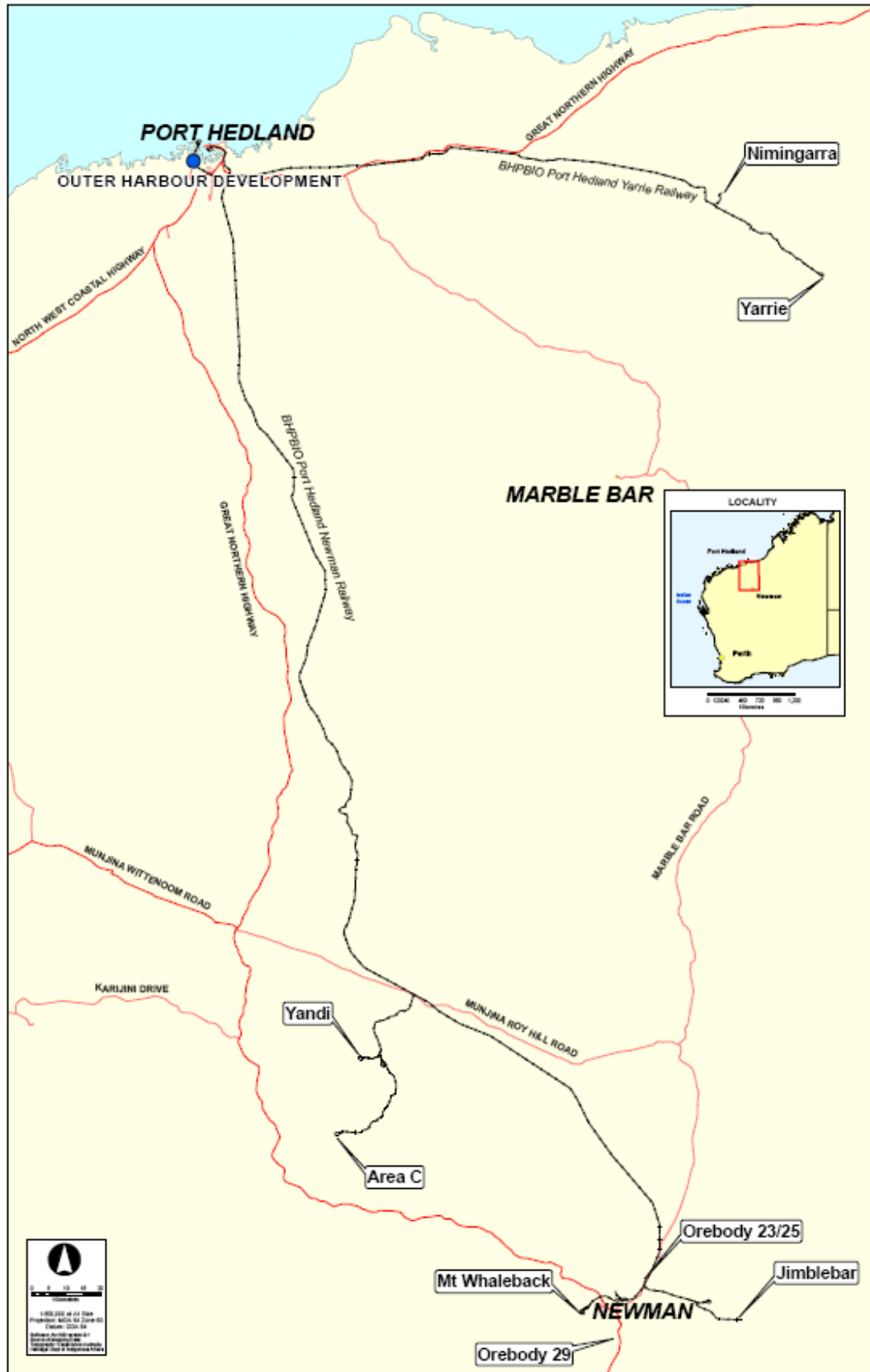


Figure 2-1 BHPBIO Existing Operations



FIGURE 2
PORT HEDLAND OUTER HARBOUR DEVELOPMENT
Port Hedland
Existing Operations

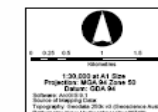


Figure 2-2 Port Hedland Existing Operations

2.2 PURPOSE OF THIS DOCUMENT

This Environmental Scoping Document has been prepared for submission to the Western Australian Environmental Protection Authority (EPA) and Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) to highlight the key environmental factors relevant to the Outer Harbour Development and the proposed scope of environmental investigations and studies to address the potential environmental impacts.

This document expands on information contained in the referral document submitted to the EPA in April 2008 and is structured as follows:

- The Environmental Impact Assessment Process: An overview of the proposed assessment approach, schedule and applicable legislation and standards;
- Project Description:
 - A summary description of the Outer Harbour Development proposal;
 - A summary of alternatives considered and justification for the selection of the preferred option;
- Regional Environmental Setting: A summary of existing environmental issues within Port Hedland;
- Community and Other Consultation: A summary of the communication and stakeholder consultation plan for the project;
- Preliminary Impact Assessment:
 - Identification of the relevant environmental factors and the potential environmental impacts known at this stage of the project;
 - A preliminary risk assessment of the potential environmental impacts, their significance and identification of the key environmental factors to be addressed in the impact assessment; and
- Potential Environmental Impacts: A summary of the proposed scope of environmental investigations and studies to address the potential environmental impacts.

This document has been prepared in accordance with the requirements of Part IV of the *Environmental Protection Act* (EP Act), the EPA "Guide to Preparing an Environmental Scoping Document" (July 2007) and the requirements of Schedule 4 of the EPBC Regulations and the *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act).

2.3 THE PROPONENT

The proponent for this proposal is:

BHP Billiton Iron Ore
225 St Georges Terrace
PERTH WA 6000

The key contact for this proposal is:

Gavin Price
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BHP Billiton Iron Ore

Ph: (08) 6224 4024

Email: Gavin.Price@bhpbilliton.com

2.4 PROJECT JUSTIFICATION

The existing facilities and capacity at Port Hedland, including future expansion proposed within the inner harbour will be unable to meet BHPBIO's growing export demands. The proposed Outer Harbour Development is required to meet these increasing demands and will assist in meeting BHPBIO's target export capacity of 300 Mtpa by 2015.

If BHPBIO is able to expand the capacity of its Port Hedland operations, there is significant opportunity to increase its export earnings. The economic benefits to the local area, Western Australia and Australia, would be realised.

The proposed Outer Harbour expansion will provide benefits to the State and Nation including:

- Increased royalties from the sale of additional iron ore;
- Increased employment and training opportunities; and
- Ongoing contribution to the local economy and community through town amenity, employee expenditure, company subsidies and contributions.

In pursuing ongoing growth plans, BHPBIO is committed to working with local communities to support sustainable development in the region and ensure their needs are incorporated into growth plans.

To satisfy the requirements of DEWHA, the Public Environmental Review (PER)/Environmental Impact Statement (EIS) will briefly address:

- Consequences of not proceeding with the action;
- How the action relates to any other actions that have been, or are being taken or that have been approved in the region affected by the action;
- Other approvals and conditions relating to the proposal; and
- The environmental record of the proponent.

2.5 ALTERNATIVES CONSIDERED

To accommodate BHPBIO's future growth plans a concept study was undertaken to evaluate the potential options for increasing port capacity in the Pilbara region of Western Australia.

In addition to considering further development at Port Hedland, several coastal locations within 150 km of Port Hedland were identified as potential sites for the establishment of a new port facility and associated supporting infrastructure.

These locations were identified based on a desktop review of previous studies, navigation charts and topography and include (Figure 2-3):

- Cape Keraudren;
- Depuch Island;
- Ronsard Island; and
- Cape Thouin.

An initial coarse screening of these alternative port locations determined that further investigations were warranted for Ronsard Island and Port Hedland, in particularly Finucane Island. The other locations were discounted due to physical, operational and environmental considerations.

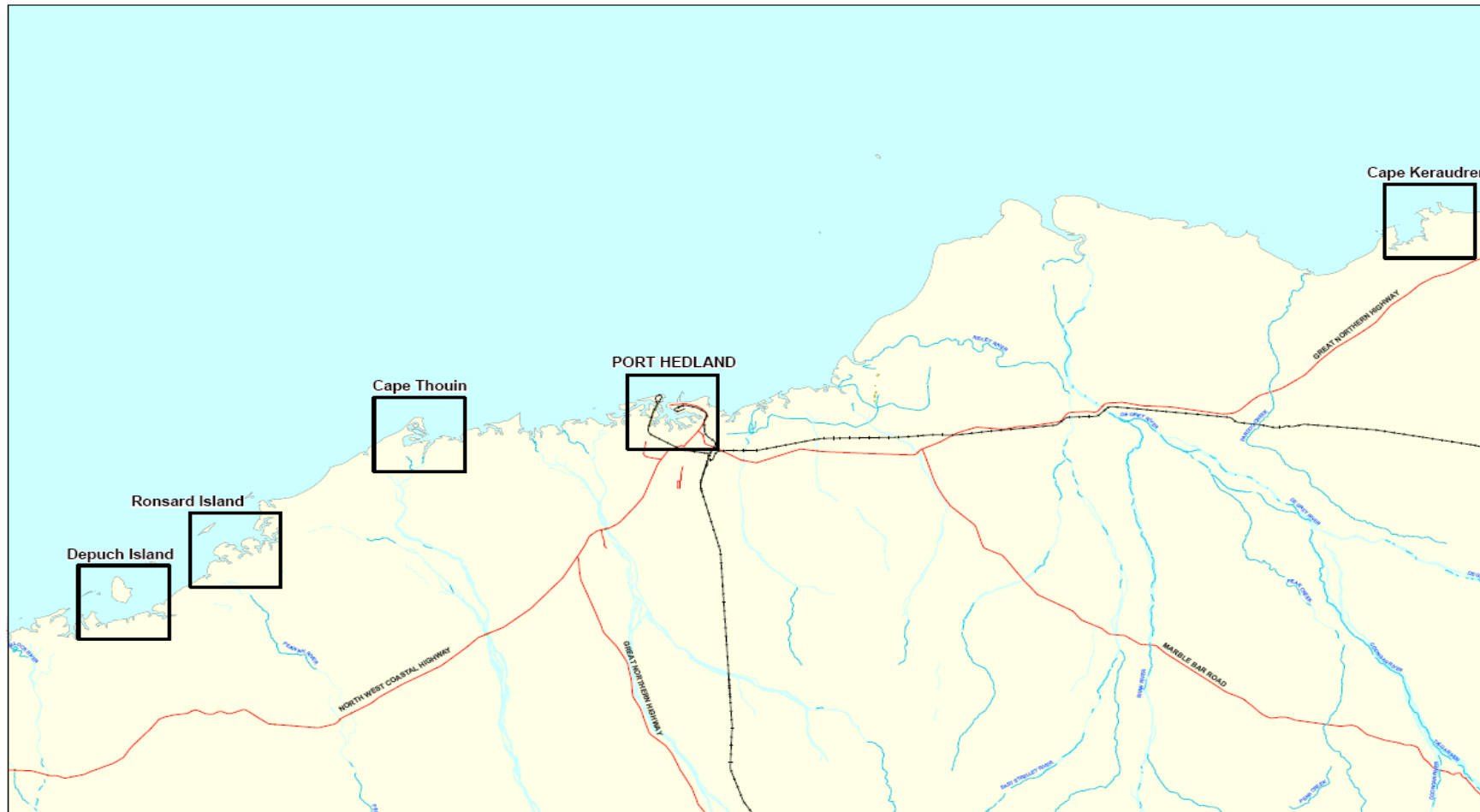






FIGURE 4
PORT HEDLAND OUTER HARBOUR DEVELOPMENT
Alternative Port Locations

Legend

-  Major Sealed Road
-  Existing Railway
-  Major Watercourse



0 2.5 5 7.5 10 12.5
Kilometres

PROJECT: PORT HEDLAND OUTER HARBOUR DEVELOPMENT
DRAWN: 02/04/08

Software: ArcGIS version 9.1
Scale: 1:50,000
Datum: GDA94
Projection: UTM
Units: Metres

Figure 2-3 Alternative Port Locations

PORT HEDLAND OUTER HARBOUR DEVELOPMENT

In evaluating Ronsard Island and Finucane Island, the following criteria were considered:

- Biophysical environment (environmental values);
- Disturbance footprint;
- Heritage;
- Land use;
- Development schedule and cost;
- Proximity to existing infrastructure; and
- Proximity to community infrastructure and services.

The qualitative outcomes of the evaluation process between Finucane Island and Ronsard Island is shown in Table 2-3 below.

Table 2-3 Site Selection/Assessment Overview – Ronsard Island vs. Finucane Island

Criteria	Ronsard Island	Finucane Island
Biophysical environment	1	3
Disturbance footprint	1	2
Land use	3	1
Heritage	1	2
Schedule and cost	1	2
Supporting infrastructure	1	3
Community infrastructure	1	3

1	High impact/least preferred	2	Medium impact	3	Low impact/most preferred
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Finucane Island was selected as a preferred port location for the following reasons:

- More detailed understanding of existing environment and baseline conditions compared to Ronsard Island;
- Development of an already disturbed versus pristine environment;
- Smaller environmental footprint compared to Ronsard Island;
- Existing community infrastructure;
- Synergies with existing port and service facilities; and
- Reduced capital costs and schedule.

Land use considerations were rated higher for Finucane Island compared to Ronsard Island due to the interfaces with existing and planned urban uses within the Port Hedland area. Potential constraints due to land use issues are a key consideration of the detailed design of the proposed Outer Harbour Development. In the PER/EIS, BHPBIO will also consider short, medium and long term advantages and disadvantages for the alternatives stated above.

2.6 PORT HEDLAND DEVELOPMENTS

Within the Port Hedland Harbour a number of developments are in the process of being approved or are under construction.

BHPBIO is in the process of expanding its inner harbour operations through a series of Rapid Growth Projects (i.e. Rapid Growth Projects 4, 5 and 6). These projects include the expansion of port and rail facilities to accommodate increased iron ore production from BHPBIO's mines.

Fortescue Metals Group (FMG) is in the process of developing their rail and port facilities. This includes the development of port facilities at Anderson Point and a railway stretching south-south east 345 km to resources in the East Pilbara.

The Port Hedland Port Authority (PHPA) proposes to expand its port operations by developing berth facilities at Utah Point, known as the Utah Point Berth Project.

It is anticipated that BHPBIO's Outer Harbour Development will not impact on the above mentioned developments within the Port Hedland area. BHPBIO will continue to liaise with PHPA to ensure that the Outer Harbour Development is consistent with the long-term development plans for the region.

Further detail is provided in Sections 5.2 and 5.3.

3 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

3.1 OVERVIEW

The Outer Harbour Development was referred to the EPA on 7 April 2008 and a PER level of assessment was set on 30 April 2008.

The project was also referred to the Commonwealth DEWHA under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) on 4 April 2008 as components of the project are located in Commonwealth waters (beyond 3 nautical miles (nm)).

The proposed action was determined a controlled action and the level of assessment has been set at EIS by the delegate of Environment Minister under the EPBC Act, on 15 May 2008. DEWHA determined that the project may impact on the following Matters of National Environmental Significance and will require assessment to define potential impacts and detail appropriate management measures:

- Listed threatened species and communities (EPBC Act, Sections 18 & 18A);
- Listed migratory species (EPBC Act, Sections 20 & 20A); and
- Commonwealth marine areas (EPBC Act, Sections 23 & 24A).

BHPBIO will undertake the State and Commonwealth assessments through a coordinated approach and produce a single PER/EIS to satisfy the requirements of both jurisdictions.

As the proposal includes sea dumping, it will also be necessary to obtain a Sea Dumping Permit under the *Environment Protection (Sea Dumping) Act 1981*. A Sea Dumping Permit application was submitted to DEWHA on the 14 April 2008. The PER/EIS document will include additional information to assist in processing this application.

The Outer Harbour Development will be designed, constructed and operated to avoid, as far as practicable, hazards that could lead to environmental effects.

The overriding principles for the Outer Harbour Development are outlined in the BHP Billiton Sustainable Development Policy (Appendix A), which states that BHPBIO will:

- Strive to achieve leading industry practice;
- Meet or, where less stringent than our standards, exceed applicable legal and other requirements;
- Set and achieve targets that promote efficient use of resources and include reducing and preventing pollution; and
- Enhance biodiversity protection by assessing and considering ecological values and land use in our activities.

BHPBIO has adopted a risk-based assessment approach to determining those environmental factors that are of significance to the Outer Harbour Development. The factors of significance have been determined based on existing environmental information, findings from preliminary studies and ongoing stakeholder consultation.

The principle of hierarchy of controls is being applied to ensure risks are eliminated, or where this is not possible, minimised and adequate controls applied.

This document focuses on the proposed scope of environmental investigations and studies to address those environmental factors that have been identified as high and medium (Section 8).

Studies for environmental factors of lower significance will be undertaken and the results will be summarised in the PER/EIS. Although, the detailed scope of these studies is not described in this document, adequate information will be provided to clearly show that the potential impacts on the environment will be manageable.

PORT HEDLAND OUTER HARBOUR DEVELOPMENT

The risk-based approach will be continually reviewed throughout the environmental impact assessment process by collating environmental information and implementing a public consultation program to ensure appropriate feedback on particular issues. Any resulting changes to the classification of the factors will be documented in the PER/EIS.

3.2 PROJECT AND ASSESSMENT SCHEDULE

In addition to environmental assessment, BHPBIO will also be required to seek other relevant permits and licences prior to construction and operation. As a minimum, the following approvals and conditions will need to be obtained and/or fulfilled by BHPBIO:

- Ministerial Conditions set by the Commonwealth and State Environment Ministers;
- Works Approval and Licence under Part V of the EP Act;
- Local government development approvals;
- Building Licence; and
- Commonwealth Sea Dumping Permit.

BHPBIO's proposed schedule for undertaking the environmental approvals process is provided in Table 3-1.

Table 3-1 Project Milestones

Project Milestone	Schedule Timing
Submit Environmental Scoping Document to EPA	June 2008
Approval of scoping document	September 2008
Submission of Sampling and Analysis Plan (SAP)	September 2008
Proponent submits draft PER	December 2008
Sampling and Analysis Plan approved (Commonwealth)	December 2008
EPA authorises PER for public review (8 weeks)	March 2009
Proponent Responses to submissions / Final PER	June 2009
EPA undertakes assessments and reports to Minister	August 2009
Minister publishes EPA Report	August 2009
Appeal(s) to Minister	August 2009 – October 2010
Works approval application submitted	August 2009
Commonwealth Ministerial Approval	October 2009
Commonwealth: Grant of Sea Dumping Permit	October 2009
Implement Ministerial Conditions	November 2009
Works approval issued	November 2009
Construction activities commence (earthworks)	November 2009
Approval of Dredging and Dredge Spoil Disposal Management Plan	December 2009
Construction activities commence (dredging)	December 2009
First ore shipment	June 2012

3.3 APPLICABLE LEGISLATION AND STANDARDS

3.3.1 State

The EP Act is the principal statute that provides a tool for environmental protection in the state of Western Australia. The Act is administered by the EPA, the Department of Environment and Conservation (DEC) and the Minister for the Environment.

In addition to the EP Act, there are other Acts and Regulations that will apply to this proposal. The key state legislation is listed below:

- *Aboriginal Heritage Act 1972;*
- *Conservation and Land Management Act 1984;*
- *Environmental Protection Regulations 1997;*
- *Contaminated Sites Act 2003;*
- *Environmental Protection (Noise) Regulations 1997;*
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004;*
- *Environmental Protection (Controlled Waste) Regulations 2004;*
- *Environmental Protection (NEPM-NPI) Regulations 1998;*
- *Health Act 1911;*
- *Port Authorities Act 1999;* and
- *Wildlife Conservation Act 1950.*

3.3.2 Commonwealth

As part of the dredging program will occur within the PHPA limits, BHPBIO will be required to obtain consent from the PHPA prior to the commencement of dredging. BHPBIO is working closely with the PHPA in relation to the Outer Harbour Development.

The Commonwealth legislation and regulations relevant to this proposal include:

- *Australian Ballast Water Management Requirements & Australian Quarantine Regulations 2001;*
- *Australian Heritage Council Act 2003;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Environment Protection (Sea Dumping) Act 1981;*
- *Native Title Act 1993;* and
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983.*

3.3.3 Guidelines and Standards

A number of State and National guidelines and standards are applicable to and have been considered during planning of this proposal. EPA Position and Guideline Statements applicable for the assessment of environmental impacts are included in Table 7-2.

4 PROJECT DESCRIPTION

4.1 THE PROJECT

The proposed Outer Harbour Development will provide an export capacity of approximately 200 to 240 Mtpa of iron ore. It will be established in stages, indicative timeframes for construction completion have been included in Table 4-1.

Details of the modular incremental expansions or staging options to reach the 200 to 240 Mtpa capacity are still under consideration, however it is envisaged that the first stage of the project will consist of two Modules to deliver a throughput of 100 to 120 Mtpa (each Module has a nominal capacity of 50-60 Mtpa), with future expansion to 200 to 240 Mtpa during subsequent stages (four Modules) (Table 4-1). This scoping document covers the export capacity of approximately 200 to 240 Mtpa and approvals are being sought for associated infrastructure required to deliver this capacity.

Table 4-1 Outer Harbour Development Staging - Modules

	Outer Harbour Development Project Staging			
	Stage 1		Stage 2	
	Module 1	Module 2	Module 3	Module 4
Estimated Construction Completion	June 2013	June 2014	2016	2017
Total Capacity	50-60 Mtpa	100-120 Mtpa	150-180 Mtpa	200-240 Mtpa
Landside Components				
Car Dumper	✓	✓	✓	✓
Stockyard	✓	✓	✓	✓
Stacker	✓	✓	✓	✓
Reclaimer	✓	✓	✓	✓
Lump re-screening plant	✓	✓	✓	✓
Re-screened fines stockyard	✓ Shared, construct Module 1		✓ Shared, construct Module 3	
Marine Components				
Loading berths	2	2	2	2
Shiploader	✓	✓	✓	✓
Berth pockets	✓	✓	✓	✓
Link Channel	✓	✓		
Arrival/Departure Basin	✓	✓	✓	✓
New channel		✓		

The project description outlined below is based on current engineering design. These details may change as design is further defined and finalised. The Outer Harbour Development comprises the following major components (from terrestrial to marine environment):

- Rail spur from the existing BHPBIO mainline to proposed stockyards at Boodarie (Section 4.1.1);
- Rail loops at Boodarie (Section 4.1.2);
- Stockyards at Boodarie (Section 4.1.3);
- Infrastructure corridor (including conveyors, access roadway and utilities) from the stockyards to the proposed jetty (Section 4.1.4);
- Jetty, wharf, dredged channel, reclamation of marine environment, basins and berthing pockets to accommodate bulk carriers (Section 4.1.5 and 4.1.6); and
- Supporting infrastructure including access roads, upgrades to existing roads and utilities, buildings, temporary construction facilities and communication systems (Section 4.1.7).

4.1.1 Rail Spur - Existing BHPBIO Mainline to Boodarie

A new rail spur line is proposed, from the existing Port Hedland - Newman main line (approximately 20 km south of Port Hedland) to the proposed stockyard area located in the vicinity of the decommissioned HBI plant. BHPBIO is evaluating a number of alignments although the preferred rail spur layout (see Figure 4-1) traverses west from the Port Hedland - Newman main line for a distance of approximately 10 km, before tracking north to Boodarie.

The double tracked rail spur will traverse relatively flat terrain and will be constructed above flood event levels and on embankments. The preferred alignment will require two major drainage structures or bridges at South West Creek, which will be further defined and finalised during the detailed engineering phase.

A crossing will be required at the Great Northern Highway interface. BHPBIO has held discussions with Main Roads WA in regards to the proposed rail crossing, and will continue to consult upon further definition of engineering design. Based on results from BHPBIO's social impact assessment processes, it is anticipated that the rail spur will be grade separated and the Highway will be realigned above the rail on a bridge structure.

BHPBIO has also held initial discussions with FMG in regards to the proposed rail crossings, and will continue to consult upon further definition of the alignment and engineering design.

4.1.2 Rail Loops at Boodarie

The proposed rail loop will start at the northern end of the rail spur in the vicinity of the decommissioned HBI plant and will be approximately 10 km in length.

The preferred alignment (see Figure 4-1) will comprise of four parallel rail loops (one rail loop per Module) and associated car dumpers that will tie in with the stockyard arrangement. Suitable locations for the marshalling yards, passing loops and maintenance areas are currently being investigated.

4.1.3 Stockyards at Boodarie

New stockyards will be constructed to deliver an estimated capacity of approximately 240 Mtpa for shipment. Lump re-screening will be required to ensure product quality although there will be no crushing of ore at the stockyards (all crushing will occur at the mine sites).

The stockyard design will be based on a modularised concept, with a total of four modules. Each module will comprise:

- A car dumper with a nominal 50-60 Mtpa capacity;
- A yard with five 200,000 (live) stockpiles per module;
- A stacker;
- A reclaimer;
- A lump re-screening plant; and
- A re-screened fines stockyard (shared between two modules).

The preferred alignment for the stockyards (see Figure 4-1) will be located approximately 8 km from the centre of Port Hedland and 7.5 km from South Hedland. The preferred arrangement for the stockyards locates each of the initial modules and car dumpers to the north of the HBI plant. Each subsequent module will then be constructed to the south of the previous module.

Other major facilities within the stockyard area will include a control room, offices, workshops, substations, sample stations, ablutions, and ancillary infrastructure. Infrastructure that is already in place from the existing HBI plant will be re-used where possible.



FIGURE 4-1
PORT HEDLAND OUTER HARBOUR DEVELOPMENT
Conceptual Overview of Project Footprint Areas



Figure 4-1 Conceptual Project Footprint Layout

4.1.4 Infrastructure Corridor from the Stockyards to the Jetty

An infrastructure corridor will be required to the west of the existing Finucane Island rail line to transport iron ore from the proposed stockyards to the jetty on the northern shore of Finucane Island.

The corridor will include:

- An access roadway;
- Four overland conveyors approximately 8 km in length; and
- Utilities including power, water and communications.

Transfer stations, sample stations, conveyor drivers, cranes and laydown areas, and an electrical substation will be constructed at the head end of the overland conveyor on Finucane Island.

A modularised concept has been adopted for the design and construction of the conveyors with the construction of two parallel overland, jetty and wharf conveyors for Stage 1 (100 to 120 Mtpa throughput) with provision for an additional two systems for the ultimate port capacity (200 to 240 Mtpa). It is proposed that each overland conveyor will be fed ore from a separate loading point, for each Module.

The nominal height along the conveyor will range within 1-2 m. The maximum height will be at the head pulley at approximately 16 m, with the tail reaching 10 m.

The corridor will have a nominal width ranging between 80 and 110 m, with a maximum of 140 m required near the proposed transfer station located on Finucane Island. The four conveyors will replace the existing HBI conveyor where possible.

4.1.5 New Dredged Channel, Wharf and Jetty

The preferred location for offshore maritime infrastructure is up to 6 km offshore from Finucane Island and adjacent to the existing Port Hedland channel (Figure 4-1). The marine facilities have been designed to accommodate bulk carriers ranging from 180,000 deadweight tonnes (DWT) to 320,000 DWT.

The offshore maritime infrastructure will comprise of:

- Jetty - construction of a piled jetty up to 6 km long from Finucane Island to the wharf, which will support conveyors, services and a roadway structure for vehicle access to the wharf head. The proposed jetty route will be constructed in variable bathymetry with the first inshore section (0-3 km) constructed in shallow water (0 to -1 Chart Datum (CD)) and the second offshore section (3-6 km) constructed on a seabed varying from approximately -1 to -8 CD. Engineering studies are currently evaluating the design of the jetty structure;
- Wharf and Berthing Structures – the wharf structure and associated berthing and mooring dolphins will be located up to 6 km north of the northern tip of Finucane Island. The wharf will be approximately 1 km in length and will be designed to accommodate shiploaders, shiploader rail system, an access roadway, maintenance bays, access walkways, the conveyor system and services. Four berths are proposed for Stage 1, two either side of the wharf, which will be expanded to provide an additional four berths during Stage 2;
- Shiploaders and Conveyors – installation of two shiploaders (slewing, luffing, long travel ship loaders) in each stage, totalling four for the Outer Harbour Development. The ore will be delivered to the shiploaders via two conveyors (one conveyor to each shiploader) located on the jetty and wharf;
- Channel, Arrival and Departure Basins and Berth Pockets – dredging of a channel approximately 34 km in length to accommodate the design vessels. The proposed channel alignment is a duplication of the existing Port Hedland channel, however the departure route deviates to the north-west towards its northerly extent. The chosen alignment is the shortest possible route to deep water from the preliminary berth site, and has been selected with due

avoidance of charted shallow water, sensitive marine habitat and maximising synergies with existing shipping infrastructure. The layout and widths of channels, arrival and departure basins and berth pockets have been designed for the proposed vessel types in accordance with international standards. The required declared depths will be approximately 21.4 m CD for the berth pockets, 23.1 m CD for the wharf area, 10.9 m CD for the arrival basin and 16.3 m CD for the departure basin, based upon a 250,000 DWT vessel. Up to 3 km of this channel and the basins and pockets will be located in State waters and the remainder in Commonwealth waters; and

- Navigation aids will be provided in accordance with the requirements of the PHPA, International Association of Lighthouse Authorities (IALA) and International Maritime Organisation (IMO).

The final alignment and geometry of the proposed shipping channel and maritime infrastructure is still being investigated and will be finalised during the engineering definition phase.

4.1.6 Dredging and Spoil Disposal Program

The construction of the Outer Harbour Development will require dredging to enable vessel access to the wharf infrastructure. A bathymetric survey conducted in 2007 indicated that the depth of the existing seabed varies within the project footprint from less than +1.4 m CD to over -25 m CD.

The volume of dredge spoil is estimated to range between 41 and 65 million cubic metres (Mm³) of material based on the alternative design options under consideration. Geotechnical investigations and seismic refraction surveys have identified a range of material types. The majority of material can be removed by a trailing suction hopper dredger (TSHD). A smaller percentage of the material is harder and will require either a cutter section dredger (CSD) to remove, or potentially blasting. Offshore geotechnical investigations are ongoing to characterise the dredge material, determine dredging techniques and optimise engineering design.

It is estimated that approximately two thirds of the dredging will be associated with the proposed wharf and berth pockets that are currently located in State waters. The estimated dredge volume will be further refined by engineering design and evaluated during the impact assessment stage.

It is envisaged that dredging activity will progress in a staged manner, as follows:

- Stage 1, Module 1 – dredging of berth pockets, eastern arrival and departure basins and a link channel to the existing channel to provide one loading and one layby berth with a single shiploader;
- Stage 1, Module 2 – dredging of the western arrival and departure basins and widening of the link channel, to upgrade the layby berth to a loading berth, and to provide two additional loading berths and a shiploader. This staging also includes the dredging works for the duplication of the existing channel; and
- Stage 2 – extension of the berth pockets, arrival and departure basins to accommodate another four loading berths and an additional two shiploaders.

Options for dredge spoil disposal are currently being evaluated, including the feasibility for onshore disposal for some of the material to be used as a source of fill. Dredging activities and dredge spoil disposal will be undertaken in accordance with the Dredge Spoil and Disposal Management Plan (DSDMP) (see Section 8.5.1).

The suitability of potential spoil locations are currently being investigated and preferred locations will be defined once final dredge volumes and dredge plant equipment are known. Any offshore spoil grounds will be located in Commonwealth waters in depths of greater than 10 m CD and will be located clear of existing and proposed channels and anchorages and sensitive benthic habitats.

4.1.7 Supporting Infrastructure

The supporting infrastructure and ancillary works associated with the proposed Outer Harbour Development will include:

- New access roads;

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- Upgrading works (where required) to existing roads and utilities including power, water and domestic sewage;
- Buildings (including various workshops, offices, laboratories, security facilities, customs and rail facilities);
- Temporary construction facilities (including laydown yards, compounds and fuel storage); and
- Communication and signal systems.

4.1.8 Scope Exclusions

A number of other tasks will be required to be completed at Port Hedland in addition to the scope of the Outer Harbour Development. Environmental approvals for these tasks will be progressed outside the scope of the Outer Harbour Development approvals process. These works include:

- Water supply and distribution infrastructure (Section 4.1.8.1);
- Power supply and distribution infrastructure (Section 4.1.8.2);
- Rail workshops and associated infrastructure;
- Materials Offloading Facility (MOF) and Preassembled Modular Road (PAM); and
- Accommodation facilities.

Where appropriate, these works will be referred to the EPA and/or DEWHA separately and assessed under relevant approval processes. A brief discussion of BHPBIO's approach to securing water and power supply is provided in Section 4.1.8.1 and 4.1.8.2.

4.1.8.1 Water

Water for BHPBIO's existing operations at Nelson Point and Finucane Island is supplied by the Water Corporation from two pump stations known as Lot 954 and Lot 2519 (BHPBIO, 2006). The Water Corporation draws this water supply from the Yule and Namagoorie borefields located in the region.

BHPBIO has undertaken a preliminary Water Demand Study to evaluate the water requirements to support its proposed development. The indicative water demand for the Outer Harbour Development is approximately 4-5 giga-liters per annum (GL/a) as shown in Table 4-2. An indicative timeline and cumulative volume to be utilised by BHPBIO's Port Hedland operations is included. There is sufficient water available to support the Outer Harbour Development until June 2015 when Stage 2 commences.

Table 4-2 Indicative Water Supply Demand for Port Hedland Operations

Project Stage	Water Demand (GL/a)	Cumulative Demand (GL/a)	Timeline
Inner Harbour Developments			
Rapid Growth Projects (RGP 1 to 3)	4.0	4.0	
RGP 4	1.5	5.5	
RGP 5	1.1 / (0.4 reduction)	5.1	January 2011
RGP 6	0.5	5.5	June 2012
Outer Harbour Development			
Module 1 (60Mtpa)	1.4	6.9	June 2013
Module 2 (120Mtpa)	1.0	7.9	June 2015
Module 3 (180Mtpa)	1.0	8.9	2017
Module 4 (240Mtpa)	1.0	9.9	2019

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4.1.8.2 Power

The forecast power requirement for the Outer Harbour Development is 111.5 megawatts (MW). There is sufficient existing generation capability at Babcock & Brown Power's (BBP) power stations at Boodarie and Port Hedland to meet the forecast loads in Table 4-3.

Table 4-3 Indicative Power Supply - BHPBIO's Port Hedland Operations

Project Stage	Nelson Point (MW)	Finucane Island (MW)	Boodarie (HBI) (MW)	West Finucane Island (MW) (new Switchyard)	Timeline
Inner Harbour Developments					
RGP 1 - 4	32	23			
RGP 5	32	31.5			January 2011
RGP 6	36.5	31.5			June 2012
Outer Harbour Development					
Modules 1 & 2 (120 Mtpa)	36.5	31.5	15	10	June 2013
Modules 3 & 4 (240 Mtpa)	36.5	31.5	25	18.5	June 2015
TOTAL	111.5 MW				

Additional generation will be required for the inland mining operations to facilitate their growth. The power supply options that are presently being considered to meet the increased demand include:

- Construction and operation of a coastal power station located at Port Hedland, and the additional construction of a transmission line to inland mining operations;
- Construction and operation of a power station at the coast and a separate power station at the mining operations; and
- Expand Newman power station.

BHPBIO uses diesel generators as a contingency supply should power supply from BBP be interrupted. This philosophy would apply for the Outer Harbour Development.

4.2 WORKFORCE

The construction workforce will vary over the construction schedule. It is expected that there will be approximately 1200 personnel, peaking at 1800 personnel (dependent on the schedule and works programme) on site for the initial stages of the Outer Harbour Development, where by additional infrastructure and head works is required. The subsequent stages of the Outer Harbour Development are expected to average approximately 800 personnel on site, peaking up to 1100 personnel on site.

An operational workforce of approximately 130 personnel will be required for the first stage, totalling up to 260 personnel for the total development.

5 REGIONAL ENVIRONMENTAL SETTING

Port Hedland is one of the largest operational ports in Australia and in the 2004/05 financial year became the first port in Australia to exceed 100 million tonnes (Mt) in a single year (PHPA, 2006).

The approved port operations within the Inner Harbour include multi-user berths managed by the PHPA and independent facilities owned and operated by BHPBIO and FMG (Figure 2-2).

The increasing demand for iron ore has led to the expansion of a growing number of port facilities within the Port Hedland Harbour. These include further developments proposed by BHPBIO, FMG and the PHPA.

5.1 KEY ENVIRONMENTAL FACTORS

As a result of increasing development within the port, a number of key environmental issues exist within the local community including impacts to air quality, noise and increasing water consumption. Through ongoing detailed consultation with the community and relevant stakeholders BHPBIO has a well developed understanding of these existing environmental issues.

Further information on regional environmental setting for each of the relevant environmental factors for the proposed Outer Harbour Development is included in Table 7-2.

5.1.1 Air Quality

Dust monitoring programs have been ongoing in the vicinity of Port Hedland since the 1970's. Numerous sites have been installed with high volume (HiVol) samplers that measure Total Suspended Particulates (TSP) and particulate matter less than 10 microns in diameter (PM_{10}). More recently, continuous monitoring has been added to the town location.

BHPBIO's port operations were previously bound by the conditions set in Ministerial Statement 433 'Upgrade Dust Management at Finucane Island and Nelson Point, Port Hedland' (Bulletin 955), issued in 1996.

In August 2006, BHPBIO sought amendments to this Ministerial Statement under Section 46 of the EP Act (BHPBIO 2006). This amendment was progressed so that the Ministerial Conditions were more closely aligned with improvements to dust management at the site and ongoing expansions at the existing Nelson Point and Finucane Island operations. The aim of the Section 46 amendment was to capture:

- Continued management and reduction of ambient dust levels;
- Assessment of dust emission performance against targets, to better reflect current community and regulator expectations;
- Initiatives to improve water-use efficiency; and
- Initiatives and developments in community consultation programs.

As a result of the Section 46, revised Ministerial Conditions (Statement 740) were set for the Nelson Point and Finucane Island operations. These conditions require the implementation of a revised Dust Management Program which sets the framework for a multi-faceted approach to dust management and improved water-use efficiency.

The Ministerial Conditions also set performance based targets (both air quality – PM_{10} and amenity related – TSP) to measure the success of the BHPBIO Dust Management Program (Table 5-1).

It is BHPBIO's intention that the Outer Harbour Development, together with BHPBIO's existing operations will meet the dust and water efficiency performance targets outlined in Ministerial Statement 740.

Table 5-1 Section 46 Dust Performance Targets

Performance Aspect	Proposed Target
Air Quality Related – Long Term Average	Improvement in the annual average PM ₁₀ monitored at the Hospital site to a long-term average target of 30 µg/m ³ .
Air Quality Related – Short Term Average	Improvement in the 24 hour average PM ₁₀ monitored at the Hospital site to a long-term target ¹ of 70 µg/m ³ with less than 10 exceedances per year.
Amenity Related	Improvement in the annual average TSP monitored at the Hospital site to a long-term target of 65 µg/m ³ .
Amenity Related – Community Perception	Improvement in amenity (relating to BHPBIO's iron ore dust) within the western end of Port Hedland.

1. "long term target" refers to achievement by 31 December 2012, with the completion of RGP4 construction and commissioning activities.

5.1.1.1 Recent Studies

Over recent years, various state and local government departments have undertaken a number of studies into the future of Port Hedland. These studies have included the following:

- A Cumulative Impact Assessment study by the Department of Industry and Resources (DoIR), investigating the likely impact of Port expansions;
- The Pilbara Air Quality Study undertaken by the DEC;
- The Pilbara Coast Water Study by the Department of Water (DoW);
- The Enquiry by Design coordinated by the Department of Planning and Infrastructure (DPI);
- The Town of Port Hedland (ToPH) led Land Use Master Plan project;
- The Port Hedland Health Study being conducted by the Department of Health (DoH);
- Port Hedland Land Use Survey (1997) by the Ministry for Planning;
- Port Strategy 1995 by the Port Hedland Port Authority, and Strategic Plan Update March 1997;
- Northern Strategic Impact Assessment ESE Study (2004) undertaken by SMEC –Port Hedland was just one of the strategic locations considered in this report;
- Port Hedland Industrial Land Use Strategy (2004) undertaken by Taylor Burrell Barnett;
- Port Hedland Area Planning Study (2003) Western Australian Planning Commission (WAPC) – provides the framework for State decision making and planning at a local level with a 20-25 year horizon;
- Port Hedland Port Authority Planning Study Phase 2 report (August 2003);
- Port Hedland Land Development Program (WAPC); and
- Wedgefield air quality monitoring results (DEC).

BHPBIO has been working in consultation with relevant agencies and local community to provide input into relevant studies. More recently these studies have been used to assist in the preparation of the Dust Management and Water-Use Efficiency Plans that have been prepared as part of the Section 46 process.

In particular, the revised dust performance targets outlined in Ministerial Statement 740 draw heavily on the preliminary findings of the Health Study. The Dust Management and Water-Use Efficiency Plans address issues raised in the Pilbara Air Quality Study, the Enquiry by Design process and community consultation that has been undertaken by BHPBIO.

5.1.2 Noise

The Port Hedland Port precinct (containing multiple industries) has historically given rise to community concerns regarding noise impacts, particularly for those community members living in close proximity to the port facilities.

Noise emissions from the port and associated infrastructure can vary considerably depending on the activities being undertaken. Traffic noise associated with major arterial roads in the vicinity also makes a considerable contribution to local noise levels during the day and into the evening.

Noise surveys of BHPBIO's operations which have been undertaken progressively over the last six years, which indicate that environmental noise emissions from the existing facilities exceed the assigned noise levels under the *Environmental Protection (Noise) Regulations 1997* (at the Hospital Monitoring Site) by up to:

- Night-time (2200 – 0700): 23 dB(A);
- Evening-time (1900-2200): 18 dB(A); and
- Day-time (0700-1900): 13 dB(A).

The scale of the Port Hedland Port precinct industrial activities and close proximity to residential premises means that meeting the Noise Regulation requirements will be an extremely onerous task.

It is BHPBIO's objective to reduce noise to as low as reasonably practicable with growth and, where possible, comply with the requirements of the Noise Regulations, including seeking an exemption.

BHPBIO plans to seek a Section 17 Regulation exemption of the Noise Regulations for its overall Port operations under the term "cannot reasonably or practically comply". A Noise Reduction Management Plan is already in place which is the first step in seeking an exemption.

The noise levels predicted with the Outer Harbour Development and associated noise mitigation measures will be incorporated into BHPBIO's Noise Reduction Management Plan and will form the basis for seeking an exemption under the noise regulations.

The exemption process is likely to take a considerable period of time and to provide confidence to regulatory authorities that noise will be addressed, a letter of intent has been sent to the Minister for the Environment (March 2008) indicating that BHPBIO will apply for a Regulation 17 exemption process once planning for growth operations come to a 'steady state'.

In early discussions with DEC it has been agreed that there is a need for an interim arrangement to ensure that noise is managed. BHPBIO will continue to work with the DEC to determine and implement a suitable and transparent noise management solution in this interim period.

BHPBIO will be in a position to seek an exemption once growth designs are completed and steady state operations apply. This will enable the exemption application to be submitted on the back of predictive noise modelling for growth designs. This is expected to occur at the end of 2010.

5.1.3 Water Use

Water supply in the Pilbara is becoming increasingly restricted due to changing climate and increased water demand in the area.

Although water supply is not included as a part of this proposal, BHPBIO recognises that sourcing additional water will require a sustainable approach and is committed to improving water use efficiency.

To support the Outer Harbour Development BHPBIO proposes to:

- Undertake a collaborative study to evaluate the potential additional water supply from the currently used Yule and Namagoorie borefields. Additional water supply sources under consideration are shown in Table 5-2;

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- Review opportunities to use non potable and recycled water for dust suppression including non potable / potable blends. Review and investigate opportunities for a new non-potable water borefield. Options for waste water reuse will also be feasible; and
- Investigate opportunities for improvement of on-site water usage and opportunities for additional recovery and improving water efficiency. This is also reflected in the Port Hedland operations Water Use Efficiency Plan, which includes a water use efficiency target of '10% reduction in fresh water consumption per tonne of ore (produced)' by 2012, with the baseline set in 2006. This target will be considered during the engineering design of the Outer Harbour Development. This will include investigation of alternative water supply options (e.g. non potable) for activities such as dust suppression.

Discussions with the Water Corporation to date have indicated that there is additional capacity of up to 2 GL/a within the currently used system that supplies Port Hedland. It is anticipated that it would take between 3 and 5 years to develop additional borefields from conceptual to water supply. There is sufficient water within the current supply from the Water Corporation's borefields to support Stage 1 of the proposed Outer Harbour Development and most of Stage 2 (Table 5-2). BHPBIO will work collaboratively with the Water Corporation to ensure additional water is available in 2015 to support further development.

Table 5-2 Indicative Water Supply Options

Supply	Description	Supply Volume GL/annum	Future Work
De Grey River ¹	Alluvium Namagoorie Borefield Bulgarene Borefield (not developed)	7 GL Approx 3-6 GL	Brownfield assessment of sustainability of aquifer. Additional tenure, water exploration and installation of infrastructure.
Yule River ¹	Alluvium Yule Borefield	Up to 8.5 GL	Brownfield assessment of sustainability of aquifer.
West Canning Basin ¹	Broome Sandstone Aquifer Wallal Sandstone Aquifer	Approximately 18 GL (6 GL fresh) Approximately 21 GL (14 GL fresh)	Greenfield tenure, access, exploration, infrastructure.
Turner River ¹	Alluvium	<1 GL, brackish	Greenfield tenure, access, exploration, infrastructure.
Fractured Rock Aquifer	Deep water supply sourced from fractured rock	Unknown	Greenfield tenure, access, exploration, infrastructure.
Desalination	Construction of Desalination plant	Design	Technology, site selection, waste water

1. Sourced from Draft The Pilbara Coast Water Study, Department of Water, July 2008.

5.2 PORT HEDLAND DEVELOPMENT

The continued increase in demand for iron ore has led to expansion of a growing number of port facility expansions within the Inner Harbour. These developments will be considered in context with BHPBIO's proposed Outer Harbour Development project to ensure that any cumulative impacts on the Port Hedland surrounding environment and community are assessed.

The PHPA is proposing expansions of their port operations including an outer harbour development. BHPBIO is liaising with the PHPA to ensure BHPBIO's proposed Outer Harbour Development is consistent with PHPA expansion plans.

5.2.1 BHPBIO – PACE, RGP2, 3 and 4

In recent years BHPBIO has experienced unprecedented demand for iron ore from overseas markets. To cater for this demand BHPBIO has implemented a series of Rapid Growth Projects (PACE, RGP2, RGP3 & RGP4) which have brought the approved capacity of the BHPBIO port operations within the Inner Harbour to 155 Mtpa. RGP4 also included the decommissioning of crushing and screening operations at the port.

5.2.2 Port Hedland Port Authority

PHPA is responsible for the overall management of the Port of Port Hedland. The PHPA covers an area of approximately 41,822 ha and encompasses the inner harbour and the seaward area in a 10 nautical mile (nm) radius of Hunt Point, from the entrance of the Inner Harbour to the high water mark at the shoreline (PHPA 2006).

The Port is the key export centre for many mines operating in the Pilbara region. Iron ore is the main export commodity, along with other products such as salt, manganese ore, chromite ore, copper concentrate, live beef and general cargo. The Port is the second largest tonnage port in Australia. Currently the PHPA manages three berths within the West End area of the harbour to support export of the above commodities.

5.2.3 Fortescue Metals Group

FMG has received environmental approval for the development of the Pilbara Iron Ore Infrastructure Project that will deliver 45 Mtpa of iron ore export capacity. Stage A of the project involved the construction of a port facility at Anderson Point in Port Hedland which included: shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles, ancillary facilities and a connecting north-south railway over a distance of 345 km to resources in the east Pilbara at Mindy Mindy. The two berths have been constructed at Anderson Point and recently commissioned.

5.3 PORT HEDLAND PROPOSALS**5.3.1 BHPBIO – RGP5 and 6**

BHPBIO is proposing further Inner Harbour expansion as part of the RGP5 and RGP6 projects including dredging of four additional berths, two berths at Harriet Point and two berths at Nelson Point. These dredging projects will be the subject of separate environmental approvals processes. RGP5 has recently been submitted and is currently in progress. This seeks approval to dredge 3.9 Mm³ and dispose up to 800,000 m³ offshore to PHPA spoil ground "I". RGP6 is currently in prefeasibility.

5.3.2 Port Hedland Port Authority

The PHPA is currently proposing to construct an additional berth at Utah Point on Finucane Island to meet growing market demands. The proposed PHPA Utah Point Berth Project is currently being assessed by the EPA at a PER level of assessment.

5.3.3 Fortescue Metals Group

In May 2007, FMG referred the proposal for an additional berth at Anderson Point to the EPA. It is understood that this proposal is currently being assessed by the EPA, and will provide FMG with three additional berths.

5.3.4 Port Hedland Port Authority Ultimate Development Plan

In conjunction with other major upgrades, the PHPA has released a draft Ultimate Development Plan (UDP) that details the proposal to develop their own outer harbour multi-user port facility of 200 Mtpa capacity, in addition to BHPBIO's proposed Outer Harbour Development.

The UDP outlines areas that are potentially available for development in the PHPA lease boundary and provides an overview of potential future development models for the Port. BHPBIO consults regularly with the PHPA and will continue to ensure consistency with longer term development within the Port Hedland region.

6 COMMUNITY AND OTHER CONSULTATION

6.1 COMMUNITY INVOLVEMENT PROGRAM

BHPBIO's approach to the community is described in the BHP Billiton 'Sustainable Development Policy' (2005) (Appendix A) which states that wherever the company operates BHPBIO will:

"Engage regularly, openly and honestly with people affected by our operations and take their views and concerns into account in our decision making".

6.2 SOCIAL IMPACT ASSESSMENT

BHPBIO has an ongoing program for engaging the local communities to understand their views with regards to expansion plans and operational activities.

This information has provided strong and consistent evidence on the issues of concern to these communities. The surveys have highlighted consistent themes and have provided a solid foundation for understanding potential social impacts associated with future developments including the Outer Harbour Development.

BHPBIO has recently developed a tool for modelling information from existing and ongoing community surveys and stakeholder management programs. This model forms the foundation for the Social Impact Assessment (SIA) that will be conducted for the Outer Harbour Development and the data and methodology will be reviewed independently to test the validity of the model and make further recommendations to better manage positive and negative impacts associated with the project.

Focus areas of this study include:

- *Workforce and population change during construction and operation of the proposed project.* Workforce requirements, impacts and opportunities to enhance the local community will differ through the stages of the project. The SIA will examine those differences and make recommendations on them;
- *Local infrastructure and services* – The increased workforce associated with the construction and operation of growth projects has the potential to further increase pressures on existing local services and infrastructure. Previous surveys have identified that the majority of amenities within the town are less than adequate (focus on health, education, childcare, transport, retail and recreation). These areas are currently being studied and information will be provided to State Government to facilitate planning of service provision;
- *Accommodation* – It is likely that additional accommodation will be required for the construction and operational workforce associated with this project. Given the existing shortage of land and accommodation within Port Hedland, there is potential for negative community perceptions associated with the growth impacts on housing and accommodation. This data will also be shared with Government to allow for further land releases and accommodation for supporting services;
- *Vehicle movements* – Concern has been raised by the community in previous projects regarding road, rail and harbour traffic due to time delays and environmental noise. This issue will be examined for the Outer Harbour Development and appropriate strategies will be implemented to minimise and eliminate potential impacts; and
- *Recreation* – Early consultation has indicated community concern that there will be restrictions on areas which can be used for recreational and fishing purposes for extended periods of time including restricted public access to Finucane Island. This area will be further studied.

A number of other key focus areas have already been identified and include but are not limited to Indigenous communities, commercial and economic impacts and opportunities for enhancement, environmental impacts on community such as dust, noise, marine habitat and tourism.

BHPBIO is committed to ongoing engagement with potentially affected communities and individuals throughout the study, design, construction and operation of the proposal. BHPBIO in partnership with

relevant authorities to ensure both the impacts and opportunities presented by the Outer Harbour Development are managed effectively.

6.3 CONSULTATION

BHPBIO recognises that the Outer Harbour Development has the potential to impact on the local community and environment. A communication and engagement plan has been developed to facilitate existing communication and engagement processes with the Port Hedland community and other stakeholder groups such as State and Commonwealth departments. The process will allow for concerns and issues to be addressed, where possible, during the project design process and for an informed assessment of the potential and perceived impacts.

The engagement program for the proposed Outer Harbour Development, involves consultation with a range of stakeholders. A preliminary list of stakeholders who are likely to have an interest in the proposed Outer Harbour Development, or who may be affected by the project is provided in Appendix B.

To date, BHPBIO has undertaken preliminary consultation to provide project briefings with various community groups and government agencies. Consultation will be ongoing throughout the duration of the project including the design, construction and operational phase. BHPBIO's consultation to date with both the local community, key stakeholders and government is summarised in Appendix B.

The social, environmental monitoring and evaluation plan for all expansion projects up to 2015 is currently underway. This plan has been developed to reflect the divergence from a sequential, phased approach for development in the Pilbara, to a substantial increase in capacity by 2015. The plan has been developed from BHPBIO's existing Health, Safety, Environment and Community (HSEC) policies and protocols, EPA assessment requirements, communication and engagement plans for associated projects and discussions with relevant stakeholders. The plan has been designed to support:

- The business process of selection, definition and project implementation; and
- The project approvals, construction and completion of the Rapid Growth Projects and the Outer Harbour Development.

The scope of the plan is predominately targeted towards the effective engagement of Pilbara communities, but also includes processes to facilitate existing communication and engagement processes with other stakeholder groups such as State and Commonwealth departments and indigenous communities.

Regular, routine updates will be provided to immediate community members, representative groups and to the broader community via advertised community forums, media and electronic tools tailored to Port Hedland audiences. BHPBIO meet regularly with many of Port Hedland's stakeholders to provide update on its operations and growth projects. All growth communication tools and mechanisms will include the capacity for feedback (i.e provision of email address, telephone numbers or response sheets for formal tools and discussion components in personal interactions). All feedback will be recorded, evaluated and appropriate action taken where required.

It is intended that there will be a strong BHPBIO employee presence at consultation activities and that they will participate actively in the process.

All communication tools and mechanisms will include the capacity for feedback (i.e. provision of email address, telephone numbers or response sheets for formal tools and discussion components in personal interactions). All feedback will be recorded and will allow concerns or emerging issues to be addressed directly and brought to the attention of BHPBIO, with mitigation or management recommendations for action.

An overview of BHPBIOs planned consultation during the development of the Outer Harbour Development PER/EIS and its release is provided in Table 6-1.

Table 6-1 Overview of Proposed Consultation Plan

Timeline	Consultation Group	Consultation
September 2008 to October 2008	Regulators, Government Authorities.	Briefings with relevant departments on proposed scope and methodologies for fieldwork, modelling and content of the PER/EIS.
November 2008	Port Hedland community groups and other community shareholders (Appendix B).	Direct briefings at various regular monthly meetings, and specific briefings informing of progress of project engineering and design, environmental studies, proposed PER/EIS and project timing, and opportunity for stakeholders to raise any concerns.
December 2008 to May 2009	Regulators, Government Authorities.	Following submission of draft PER/EIS meet with relevant departments to discuss PER/EIS, and results of investigative studies.
	Port Hedland community groups and other community shareholders (Appendix B)	Direct briefings at various regular monthly meetings, and specific briefings informing of outcomes of environment studies, progress of the PER/EIS and anticipated timeframes for Public Review. Opportunity for BHPBIO to respond to community concerns.
May 2009 to August 2009	Regulators, Government Authorities.	PER/EIS public release for 8 weeks. Direct announcements to all stakeholders and community of the public review period and opportunity to make submissions. Continue with regular monthly meetings, providing opportunity for stakeholders to raise concerns and BHPBIO to respond.
	Port Hedland community groups and other community shareholders (Appendix B).	

7 PRELIMINARY IMPACT ASSESSMENT

A process of identifying potential impacts has been undertaken and included a review of the conceptual design in relation to the existing environment (Section 5), understanding the known environmental values of the project study area, and acknowledging stakeholders views on the project to date.

In this context, the impact identification process has focused on identifying the key environmental factors and most significant potential impacts associated with the Outer Harbour Development. The key objectives of this process have been to:

- Identify and record proposed activities;
- Identify and record interactions between activities, the environment and other receptors;
- Identify the key environmental and socio-economic factors and potential impacts associated with the proposed activities;
- Identify whether the impacts are likely to be unknown, unpredictable or irreversible;
- Assess the significance of each environmental factor based on potential impacts of high, medium and low (residual) risk; and
- Identify and apply a hierarchy of controls to the most significant potential impacts to eliminate risk or enable control mechanisms to be planned. This is undertaken in the context of the EPA's Principles of the Environmental Protection (Table 7-1). This will assist in developing investigative scopes of work for detailed assessment in the PER/EIS (Section 8).

A number of environmental and socio-economic factors have been identified as being relevant to the proposal. Table 7-2 outlines these factors with reference to environmental objectives, potential impacts, additional investigations required, potential management strategies, control mechanisms and relevant guidelines.

The proposed investigations and potential management measures are consistent with the EPA's Principles of Environmental Protection (Section 7.2). The preliminary impact assessment process is also consistent with BHPBIO's hierarchy of controls for managing environmental risks. As part of this approach, priority is first given to:

- Gathering adequate information to understand the environmental impacts;
- Identifying possible alternatives to avoid the environmental impacts; and
- Proposing suitable management strategies and procedures to mitigate the impact if it cannot be avoided.

7.1 SIGNIFICANCE OF IMPACTS

The potential environmental impacts have been qualitatively assessed utilising BHPBIO's risk management framework. For each factor, potential impacts were identified. All potential impacts were then scored against a severity (consequence) rating factor and a likelihood factor (refer to Appendix E) to determine both inherent (without proposed management controls) risk and residual (with proposed management controls) risk. Table 7-2 provides the results of the risk process, whereby the significance of the factor represents the highest risk achieved for the particular environmental factor.

Detailed description and context around 'consequences' ratings for each terrestrial and marine factor has been established and will be incorporated into the PER/EIS.

The factors which warrant detailed assessment in the PER/EIS have been recognised as 'key factors'.

These key factors have been classified in Table 7-2 in accordance with the following qualitative definitions and the risk assessment process described above:

Higher significance:

- Potential impacts may raise significant concern from stakeholders; and/or

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- Require high level of mitigation and/or management for potential impact to comply with guidelines and standards; and/or
- Direct/permanent loss of environmental attributes of conservation significance and/or social attributes of significance; and/or
- Risk rating score of 90 or above (Appendix E).

Medium Significance:

- Potential impacts may, but are unlikely, to raise significant concern from stakeholders; and/or
- Potential impacts require moderate management measures to comply with guidelines and standards; and/or
- Potential impacts will be localised and medium term, with moderate loss to environmental attributes of conservation significance and/or social attributes of significance; and/or
- Risk rating score between 9 and 30 (Appendix E).

Lower Significance:

- Potential impacts that are unlikely to be of significant concern to stakeholders; and/or
- Potential impacts will be minor requiring minimal management measures to comply with guidelines and standards; and/or
- Potential impacts will be localised and short term, with minimal loss to environmental attributes of conservation significance and/or social attributes of significance; and/or;
- Risk rating score between 0 and 3 (Appendix E).

7.2 PRINCIPLES OF ENVIRONMENTAL PROTECTION

The Principles of Environmental Protection are outlined in the EPA Position Statement No. 7. Proponents are required to consider these principles in the design, management and closure of their proposals. Table 7-1 provides a summary of how BHPBIO has addressed or intends to address these principles in the development of the proposal. Table 7-2 considers these principles in the identification of potential management measures.

Table 7-1 Core Environmental Principles

Principle	Relevant (Yes / No)	Consideration
<p>1) <i>The precautionary principle</i></p> <p>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.</p> <p>In application of this precautionary principle, decisions should be guided by –</p> <ul style="list-style-type: none"> a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and b) assessment of the risk-weighted consequences of various options. 	Yes	<p>Investigations and studies will be completed to provide adequate information to address potential risks and environmental impacts.</p> <p>Design options will be evaluated against environmental criteria.</p> <p>Assessment and mitigation of potential impacts will be undertaken in accordance with the predicted risk level.</p>
<p>2) <i>The principle of intergenerational equity</i></p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</p>	Yes	<p>See Principle 3. Sustainability and cleaner production principles will be incorporated into the design and operation of project to maximise biological and ecological protection.</p>
<p>3) <i>The principle of conservation of biological diversity and ecological integrity</i></p>	Yes	<p>Additional site specific studies will be undertaken to determine the presence of</p>

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Principle	Relevant (Yes / No)	Consideration
Conservation of biological diversity and ecological integrity should be a fundamental consideration.		<p>Declared Rare Flora/Fauna, Priority Flora/Fauna and Threatened or Endangered Communities.</p> <p>Final design will take into consideration the environmental values over the study area and where practicable, measures will be taken to avoid impacts (e.g. location of project footprint to minimise disturbance to mangroves).</p>
<p>4) <i>The principles relating to improved valuation, pricing and incentive mechanisms</i></p> <ul style="list-style-type: none"> a) Environmental factors should be included in the valuation of assets and services. b) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement c) The user 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. d) 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 maximise benefits and/or minimise costs to develop their own solution and responses to environmental problem 	Yes	<p>All operations will be undertaken in accordance with BHPBIO's Sustainable Development Policy. Through the application of these principles, it is anticipated that the development of the Outer Harbour will, as far as practicable, be consistent with the sustainability principles of the WA State Sustainability Strategy.</p> <p>Full life cycle costs, including decommissioning, will be considered.</p>
<p>5) <i>The principle of waste minimisation</i></p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment</p>	Yes	<p>To support the principles of sustainability, cleaner production assessments of the design will be conducted to determine the potential to reduce resource (minimise water use and dust emissions) use and waste associated with the transfer of iron ore from car dumpers, through to shiploaders. This will be undertaken during the engineering definition phase.</p>

Table 7-2 Environmental Factors, Potential Impacts & Scope of Investigations for the Proposed Outer Harbour Development

No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
Overarching Principles									
1	Biodiversity	To minimise adverse impacts on biological diversity, comprising the different plants and animals and the ecosystem they form, at the levels of genetic diversity, species diversity and ecosystem diversity.	Local and regional context of the Pilbara bioregion.	These overarching principles will be embedded as a whole of project approach. Refer to specific environmental factors below.	<ul style="list-style-type: none"> Reduced distribution or geographical extent in local and regional context; Reduced species and ecosystem diversity; Cumulative loss of vegetation communities, flora and fauna species and habitats within the region; Cumulative loss of marine Benthic Primary Producer Habitat (BPPH) within the region; and Invasive species (e.g. sparrows, house crows, starlings etc) that could potentially arrive on ships or by earth moving equipment (e.g. weeds). 	High	Biological surveys to document existing baseline conditions and to assess findings in local and regional context.	<ul style="list-style-type: none"> Avoid disturbance of critical habitat/s; Use of local seed and cuttings in rehabilitation where substrates can be re-established to support these species; and Maintenance of biodiversity within the project area will be managed in accordance with BHPBIO's standard operating practices (Construction Environmental Management Procedure (CEMP)). 	<ul style="list-style-type: none"> EPA PS No. 3; EPA GS No. 51; EPA Draft GS No. 56; EPBC Act 1999; and Wildlife Conservation Act 1950.
2	Sustainability	To ensure, as far as practicable, that the proposal meets or is consistent with the sustainability principles in the National Strategy for Ecologically Sustainable Development (Ecologically Sustainable Development Steering Committee, 1992).	The study area and adjacent areas potentially affected by the Project (e.g. ToPH).	These overarching principles will be embedded as a whole of project approach. Refer to specific environmental factors below.	Poor design and management of the project may impact on important economic, environment and social attributes on local and regional scales.	High	<ul style="list-style-type: none"> A sustainability framework will be established for the project inclusive of setting objectives and targets for the engineering design; and Cleaner production reviews and life cycle analysis will be conducted comparing designs to available benchmarks. 	<ul style="list-style-type: none"> Project design and management will consider sustainability principles outlined in the National Strategy for Ecologically Sustainable Development and the WA State Sustainability Strategy; and Cleaner production reviews will be undertaken during the engineering definition phase to reduce resource consumption of key infrastructure items including energy and water use. 	<ul style="list-style-type: none"> BHP Billiton Sustainability Development Policy, 2005; National Strategy for Ecologically Sustainable Development (Govt. of Australia 1992); Hope for the future: The Western Australian State Sustainability Strategy (Govt. WA, 2003); EPA GS No. 55; and EPA PS No. 6
3	Cumulative Impacts	To ensure appropriate consideration is given to potential cumulative impacts within the local context of the study area from existing and approved activities.	The study area and adjacent areas potentially affected by the Project (e.g. ToPH).	These overarching principles will be embedded as a whole of project approach. Specifically cumulative impacts will be addressed for noise, dust and BPPH.	Each new development in Port Hedland has the potential to add further to environmental and social impacts over and above existing levels. These cumulative impacts require assessment to maintain environmental and social values for the project and surrounding areas.	High	<ul style="list-style-type: none"> Evaluate cumulative noise and dust emissions from others including existing BHPBIO operations, proposed BHPBIO operations, PHPA operations inclusive of Utah Point and FMG's operation; and Evaluate cumulative losses of mangroves and other BPPH. 	<ul style="list-style-type: none"> Improve land use planning; and Refer specifically to individual environmental factors. 	Refer to individual environmental factors.

No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
Terrestrial Biophysical									
4	Geology, Soils (including Acid Sulfate Soils) and Landforms	To maintain the integrity, ecological functions and environmental values of landforms and soils.	Stockyards, infrastructure corridor, rail spur and loop, access roads and ancillary infrastructure and dredged channel.	<ul style="list-style-type: none"> Located on the coastal plain which is relatively flat, fringed to the north by mangroves, tidal creeks, salt flats and coastal dunes; Soils within the study area comprise of saline muds and marine sands; and There is the potential for acid sulfate soils (ASS) to occur within the intertidal zones of the study area. A review by the WAPC (Planning Bulletin 64 Acid Sulfate Soils) has mapped the proposed study area as having a 'high to moderate risk of ASS, occurring within 3 m of the soil surface. 	<ul style="list-style-type: none"> Increased erosion and possible sedimentation through changes in surface water flow regimes as a result of clearing and earthworks; Loss of topsoil; Acidification of surface and ground water leading to potential metal leaching and contamination of waters. Health and safety implications if contact is made with acidic waters; Exposure of waste material with poor physical characteristics; and Integrity of infrastructure could be compromised due to exposure to acidic environment. 	Medium	<ul style="list-style-type: none"> Geotechnical investigations will be undertaken. The results will be incorporated into the design process; Preliminary Site Investigation; Presence of ASS will be determined in two phases: <ul style="list-style-type: none"> Preliminary ASS Investigation; and Detailed ASS Investigation incorporated in geotechnical investigations. Hydrology impact study for the study area. 	<ul style="list-style-type: none"> Incorporate requirements for erosion control measures and stormwater drainage during the design phase; Develop and implement construction management procedures for clearing and topsoil handling activities; Construction activities are scheduled to be cognisant of weather conditions, in particular high rainfall periods; Develop ASS Management Plan to include management measures for the control of acid generation should ASS be found to occur. A preliminary ASS Management Plan to be developed for PER/EIS, followed by final ASS Management Plan upon completion of Detailed ASS Investigation; Selection of design materials to be considered; Develop procedures to address the management and handling of any waste materials; and Potential impacts to geology, soils and landforms will be managed in accordance with the Construction Management Procedures. 	<ul style="list-style-type: none"> National Strategy for the Management of Coastal Acid Sulfate Soils (ANZECC/ARMCANZ 2000); Identification and investigation of acid sulfate soils and groundwater (DEP/WRC, 2003); and DEC guidelines for management of acid sulfate soils.
5	Flora and Vegetation (excluding intertidal)	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through avoidance or management of adverse impacts.	<ul style="list-style-type: none"> Stockyards, infrastructure corridor, rail spur and loop, access roads and supporting infrastructure; and Protect Declared and Priority flora, consistent with provisions and Wildlife Conservation Act. 	<ul style="list-style-type: none"> The Littoral and Uaroo land systems are likely to be disturbed as a result of the proposal; and Terrestrial flora surveys completed by ENV. Australia (ENV) in October 2007 and May 2008 of the study area recorded 394 taxa, 34 vegetation communities and recorded the presence of (ENVa 2008): <ul style="list-style-type: none"> One vegetation community of conservation significance: mangroves (listed as a wetland of subregional significance); No Threatened Ecological Communities (TEC); No Declared Rare Flora (DRF) or EPBC endangered or vulnerable species; Three priority flora species: <i>Abutilon trudgenii</i> (Priority 	<ul style="list-style-type: none"> Direct loss of flora and vegetation communities of conservation significance (priority flora and mangroves); Direct loss of flora and vegetation communities due to clearing and topsoil stripping; Direct loss or degradation of flora and vegetation due to increased risk of fire from machinery and equipment during earthworks; Introduction or the spread of weeds carried on earthworks machinery and light vehicles; Loss or degradation of flora and vegetation from dust deposition during construction; and 	High	<ul style="list-style-type: none"> Baseline flora and vegetation surveys (inclusive of seasonal surveys) have been completed to identify the presence of significant flora species, vegetation communities, introduced species, threatened ecological communities, and their conservation significance; and Conduct impact assessment of the proposed project footprint on the local and regional significance of flora species and revegetation communities. 	<ul style="list-style-type: none"> Evaluate the results of flora surveys and where practicable utilise the results to avoid disturbing species or vegetation communities of significance by optimising the design and layout of project infrastructure; Minimise the clearing footprint as far as practicable; Implement an environmental awareness training program; Minimise disturbance through clearly demarcating areas and using access roads where possible; Construction activities are scheduled cognisant of weather conditions; Vehicles are maintained; 	<ul style="list-style-type: none"> EPA PS No. 2; EPA PS No. 3; EPA Draft GS No. 51, and <i>Wildlife Conservation Act 1950.</i>

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No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
				<p>3), <i>Pterocanlon sp. A</i> Kimberley Flora (Priority 2) and <i>Gymnathera cunninghamii</i> (Priority 3); and</p> <ul style="list-style-type: none"> - Three introduced flora species: <i>Aerva javanica</i>, <i>Cenchrus ciliaris</i> and <i>Eragrostis cilianensis</i>. 	<ul style="list-style-type: none"> • Loss or degradation of flora and vegetation due to drainage shadow effects. 			<ul style="list-style-type: none"> • Fire management procedure will be implemented; • Develop and implement construction management procedures for dust, weeds, ground disturbance and clearing activities; • Evaluate contractor environmental management procedures; • Prepare and implement a Dust Management Plan for operations; • Rehabilitate all temporary disturbed areas; and • Design drainage features to maintain hydrological flows across landscape. 	
6	Fauna	To maintain the abundance, diversity, geographic distribution and productivity of fauna species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge.	Stockyards, infrastructure corridor, rail spur and loop, access roads and supporting infrastructure.	<ul style="list-style-type: none"> • Terrestrial fauna surveys completed by ENV in October, November and May 2008 of the study area recorded 6 fauna habitats and 199 species of vertebrates and recorded the presence of (ENVb 2008): <ul style="list-style-type: none"> - Four habitats considered to be under represented in the Pilbara: Mangroves, Tidal flats, Dunal systems, Riverine; - One fauna species listed under the Wildlife Conservation Act 1950: <i>Aspidites ramsay</i> (Woma) (Schedule 4); - Four priority listed fauna: <i>Aspidites ramsay</i> (Woma) (Priority 1), <i>Mormopterus loriae cobourgebsis</i> (Little North-Western Freetail Bat) (Priority 1), <i>Ardeotis australis</i> (the Australian Bustard) (Priority 4), <i>Numenius madagascariensis</i> (the Eastern curlew) (Priority 4); and - Twenty three bird species listed as migratory species under the EPBC Act 1999 and 22 species listed as marine species; • Species within the study area are associated with habitats that are widely distributed and well represented throughout the Pilbara region (ENV, 2008b); and • A search of fauna listed as rare or specifically protected within the study area under the WA 	<ul style="list-style-type: none"> • Loss of significant habitat/ habitat due to clearing and earthworks; • Reduced connectivity of fauna populations, and/or isolation of local habitats due to clearing, earthworks and location of infrastructure; • Direct disturbance from construction and operation activities e.g. affects of noise, dust, light and off-road vehicles; • Loss of fauna or injury due to collisions; and • Introduction or spread of vermin due to introduced species or vermin. 	High	<ul style="list-style-type: none"> • Baseline fauna survey and assessment inclusive of short-range endemics and seasonal surveys have been completed to identify the presence of significant species, communities and habitats and their conservation significance; and • Conduct impact assessment of the proposed project footprint on the local and regional significance of fauna species. 	<ul style="list-style-type: none"> • Evaluate the results of the fauna surveys and where practicable utilise the results to optimise the design and layout of project infrastructure; • Minimise impacts on mangroves where possible; • Design to incorporate mechanisms to maintain mobility of populations. This may include grade crossings and culverts; • Where possible sand banks will be retained; • Implement an environmental awareness training program; • Provide suitable management guidelines and procedures for clearing and ground disturbance activities. This may consider pre-start procedures for clearance of fauna to remove fauna from proposed clearing areas; • Minimise clearing of high value habitats where possible, such as natural breeding grounds; and • Prepare and implement a Traffic Management Procedure that includes requirement for signage and suitable speed limits. 	<ul style="list-style-type: none"> • EPA Draft GS No. 56; • EPA GS No. 54; • EPBC Act (1999); and • <i>Wildlife conservation Act 1950</i>.

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No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
				Wildlife Conservation Notice 2006 and the EPBC Act 1999 was conducted. For specific species listings refer to Appendix C.					
7	Subterranean Fauna	To maintain the abundance, diversity, geographic distribution and productivity of fauna species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge.	Stockyards	<ul style="list-style-type: none"> Troglofauna are considered unlikely to occur within the project area. Given the depth to groundwater is shallow (3-4 m), troglofauna are likely to be outcompeted by surface animals. Existing distribution patterns suggest few, if any species would be likely to occur; Groundwater at the proposed stockyards is more saline than typically preferred by stygofauna, suggesting they are unlikely to occur. The scale of dewatering is not significant to cause impacts on populations; and Risk of groundwater contamination is considered minimal. 	<ul style="list-style-type: none"> Damage to habitat and populations due to clearing and earthworks; Spillage of environmentally hazardous materials resulting in pollution of groundwater; and Reduced population of stygofauna and damage to habitat due to dewatering. 	Medium	<ul style="list-style-type: none"> Undertake a Subterranean Fauna Risk Assessment and to identify: <ul style="list-style-type: none"> Habitat requirements; Potential existence of stygofauna and troglofauna in the study area; and Potential impacts on the habitat. Groundwater/hydrogeology assessment for proposed dewatering. 	<ul style="list-style-type: none"> Minimise footprint, proposed excavations and scale of deep dewatering activities, as far as practicable; Spill prevention for environmentally hazardous materials – e.g. management of storage, handling and spill recovery; Comply with hazmat for the storage and handling of environmentally hazardous materials; and Prepare and implement a Dewatering Management Procedure. 	EPA Guidance Statement No. 54.
8	Surface Water Flows	To maintain the quantity of water and surface water flows so that existing and potential environmental values, including ecosystem maintenance are protected.	Stockyards, infrastructure corridor, rail spur and loop, access roads and supporting infrastructure.	<ul style="list-style-type: none"> The major surface drainage features surrounding the area are the ephemeral Turner River (7 km west of the HBI plant) and South West Creek (0.75 km east of the HBI plant); and Infrastructure for the project will intersect with various minor drainage lines in the Port Hedland Coastal Catchment and the South West Creek Catchment. 	<ul style="list-style-type: none"> Flooding causing damage to infrastructure; Impeding sheet flow or drainage across the landscape; Concentration of surface flows causing erosion and saltation; and Loss of riparian vegetation and affects on water quality (e.g. erosion, loss of natural filtration systems). 	Medium	<p>Hydrological assessment of the study area will be conducted to:</p> <ul style="list-style-type: none"> Identify drainage and catchment characteristics, areas subject to flooding and prone to erosion; Determine local and regional significance of water courses found within the study area; Determine the impacts of the proposed infrastructure on surface water flows and assess cumulative effects; Recommend management and mitigation measures to minimise surface water flow disturbance; Recommend stormwater controls for the inclusion in the design phase; and Consider climate change affects and implementations on the project. 	<ul style="list-style-type: none"> Evaluate the results of the hydrological assessment and where practicable utilise the results to optimise the design and layout of project infrastructure; Include stormwater controls and flood mitigation during the design phase; and Develop design management measures to prevent flooding (including stormwater management), erosion, and maintaining drainage across the landscape. 	EPA Draft GS No. 26.

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No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
Marine Biophysical									
9	Intertidal and Subtidal Benthic Primary Producer Habitats and Associated Biota	To maintain ecological function, abundance, productivity and biodiversity of intertidal and subtidal species.	<ul style="list-style-type: none"> The coastal zone and nearshore environment that will support the proposed jetty conveyor and infrastructure corridor; and The offshore subtidal environment that could be potentially affected by a sediment plume. 	<ul style="list-style-type: none"> A survey of mangroves completed in December 2007 found three types of mangroves within the proposed footprint: <ul style="list-style-type: none"> <i>Avicennia marina</i> low forest to scrub on mid to high tidal flats; Mixed <i>Avicennia marina</i> and <i>Rhizophora stylosa</i> low forest to scrub on mid to high tidal flats; <i>Rhizophora stylosa</i> low forest to scrub on mid to high tidal flats. Preliminary marine surveys have indicated that the benthic habitat within 20 km from Finucane Island is characterised mainly by extensive plains of sand/silt, sparse pavement, and ridgelines supporting biota including hard and soft corals and sponges; and The potential macroalgae that may be found in the study area (and in the northwest of Western Australia) are not well known. One of the most prolific species present in the Pilbara is the <i>Sargassum</i> species (Huisman, 2004). 	<ul style="list-style-type: none"> Direct intertidal habitat loss (inclusive of mangroves) from construction of a jetty and establishment of an infrastructure corridor; and Loss of subtidal benthic primary producers (mangroves, scleractinian coral and macroalgae) and habitats from construction activities (sedimentation, light deprivation and shading). 	Medium	<ul style="list-style-type: none"> Baseline surveys including but not limited to benthic ecology investigations, baseline water quality and coral health will be conducted to: <ul style="list-style-type: none"> Describe and evaluate intertidal, supratidal and subtidal habitats; Determine the presence and distribution of BPPH; Conduct a sampling and analysis pilot program (SAP) to characterise sediments; Provide baseline data to assist development of the future monitoring program; Determine cumulative (historic) losses; and Determine requirement for a BPPH offset plan. Conduct associated modelling and surveys to identify areas of sensitivity and influence; Nearshore hydrodynamic/ tidal flow modelling to identify areas of sensitivity and influence; and Dredge plume modelling to predict the impact zone for BHPH (mortality, sub-lethal and no detectable change). 	<ul style="list-style-type: none"> Evaluate the results of the baseline marine survey and where practicable utilise the results to optimise the design and construction methodologies to minimise impacts on sensitive marine (BPPH) communities; and Prepare and implement a DSDMP inclusive of: water quality monitoring, coral health monitoring and management actions for trigger values. 	<ul style="list-style-type: none"> EPA GS 29; EPA GS 1; National Ocean Disposal Guidelines for Dredged Material (NODGDM); and <i>Environment Protection (Sea Dumping) Act 1981</i>.

No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
10	Hydrodynamics and Coastal Processes	To maintain the integrity and stability of the coast, seafloor and tidal creeks.	Dredged shipping channel, jetty and causeway.	The coastline surrounding the proposed development is consistent with much of the Pilbara and is characterised by a number of nearshore islands (Finucane, Downes and Weerde) and coastal inlets supporting mangrove systems. There are no significant extrusive landforms within the study area with the exception of the existing dredge reclamation spit off Nelson Point.	<ul style="list-style-type: none"> Alteration of coastal hydrodynamic and geomorphic processes; and Alteration of natural movement of sediment (erosion and deposition rates) potentially leading to enhanced erosion and alterations to coastline features. 	Medium	<ul style="list-style-type: none"> Collect baseline data to determine existing coastal hydrodynamic and geomorphic processes; and Establish hydrodynamic and geomorphic models for the study area and determine the impact of the proposed design on coastal processes and sediment stability. 	<ul style="list-style-type: none"> Evaluate the results of the hydrodynamic model and where practicable utilise the results to optimise the layout of marine infrastructure and design; Maintain as far as practicable the littoral processes on which mangroves depend (tidal flushing); and Selection of appropriate equipment and construction methods. 	DoE Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (2006).
11	Protected Marine Biota (whales, turtles etc.)	To maintain the abundance, biodiversity, productivity and geographic distribution of marine biota.	Offshore marine environment that will support the wharf, berth pockets and shipping channel and associated infrastructure.	<ul style="list-style-type: none"> Marine reptiles potentially occurring in the study area include turtles, sea snakes and salt water crocodiles; Of most significance to the study area are marine turtles. There are two turtle nesting sites in the Port Hedland area: Munda beach (30 km west of Port Hedland) and Cemetery Beach (6 km east of the project). North Turtle Island (50 km from the existing shipping channel) may also support turtles and turtle habitat; Of the large cetaceans found off the Pilbara coast, Humpback Whales are of most interest as they undertake regular migration throughout this area twice a year; The Port Hedland area is not a known calving or aggregation area for cetaceans (NHT, 2005); Previous studies have reported the Pilbara coastal waters to support small populations of dolphins and dugongs (Prince 2001). However, limited sightings have been recorded and the lack of extensive seagrass meadows within the study area would suggest that it is not an important feeding area for dugongs (Prince, 2001); and A search of fauna listed as rare or specifically protected within the study area under the WA Wildlife Conservation Notice 2006 and the EPBC Act 1999 was conducted. For specific species listings refer to Appendix C. 	<ul style="list-style-type: none"> Direct habitat loss or disturbance from construction activities (dredging, blasting, pile driving, infrastructure development and noise), shipping movements and artificial lighting; Habitat degradation and disturbance from maintenance dredging (approx every 2 years); Smothering and increase of turbidity in the water column from sediment plumes caused by dredging and spoil disposal; Direct impacts on whales, turtles, shorebirds etc as a result of collisions; and Marine mammal behavioural changes. 	High	<ul style="list-style-type: none"> An offshore marine environmental survey will be conducted to: <ul style="list-style-type: none"> Provide baseline data to describe the existing marine environment and presence of any significant features and map the distribution of marine habitats; Address data limitations on listed species or habitats; Provide background data to assist development of future monitoring programs; and Determine the presence and distribution of fauna habitats and potential foraging grounds. Dredge plume dispersion and sediment re-suspension modelling; Baseline water quality and coral health monitoring; Marine turtle survey and assessment; Light modelling assessment; Marine mammal study to incorporate potential impacts from lighting and noise generated during construction; 	<ul style="list-style-type: none"> Evaluate the results of the baseline marine surveys and where practicable utilise the results to optimise the construction methodologies to minimise impacts on sensitive marine communities; Targeted stoppages, modifications or relocation of dredging activities to minimise potential impact on cetaceans when they are determined to be nearing the study area; Prepare and implement a Significant Species Management Plan (inclusive of turtles and marine mammals) to monitor and manage potential impacts; Prepare and implement a DSDMP that includes stoppages during known periods of coral spawning; Minimise impacts associated with turbidity; Evaluate and optimise location of spoil grounds to minimise impacts where practicable; Maintenance dredge plume model and management plan; Environmental input into dredging methodology; Evaluate dredge contractor procedures and environmental management on environmental aspects; Schedule dredging activities cognisant of tide conditions and in collaboration with PHPA; Ensure the design considers 	<ul style="list-style-type: none"> EPA GS No. 1; EPA draft GS 8; and DoE Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (2006).

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							<ul style="list-style-type: none"> and Undertake marine mammal study to identify migration paths, potential for study area to be utilised (for foraging, breeding or migration) by marine mammals. 	<ul style="list-style-type: none"> the use of 'best available technology' to reduce effects of lighting to 'as low as reasonably practicable'; and Prepare and implement design specification for lighting addressing: <ul style="list-style-type: none"> - Types of lamps; - Light spill control measures; and - Location of lighting, etc. 	
12	Non - Endemic Marine Species (Marine Pests)	To maintain the abundance and biodiversity of marine biota.	Offshore marine environment that will support the wharf, berth pockets and shipping channel and associated infrastructure.	<p>A survey undertaken in 1998 by the Centre for Research on Introduced Marine Pests (CRIMP) detected the following introduced marine organisms within the Port Hedland Harbour:</p> <ul style="list-style-type: none"> - <i>hydroid: Antennella secundaria;</i> - <i>bryozoans: Amathia distans, Bugula neritina and Bugula stolonifera;</i> - <i>barnacles: Balanus amphitrite; Megabalanus tintinnabulum; and</i> - <i>dynoflagellates: Gymnodium sp. Cochlodium polykrikoides.</i> <p>The Hydroid, Byrozoan and Barnacle species detected are all well known in Australian waters and are not considered pests. <i>Amathia distans, Bugula neritina, Bugula stolonifera</i> and <i>Cochlodium polykrikoides</i> were all found to be relatively widespread throughout the harbour region. None of the species detected were identified as Australian Ballast Water Management Advisory Council (ABWMAC) target species.</p>	<ul style="list-style-type: none"> Establishment of non-indigenous marine species; and Generation of artificial substrates from project infrastructure. 	Medium	<ul style="list-style-type: none"> Undertake a desktop assessment (inclusive of risk evaluation) of impacts associated with introduced marine species and pathogens through increased shipping movements and construction equipment. 	<ul style="list-style-type: none"> Strategies will be developed for the management of potential non-indigenous marine species with reference to ballast water and dry dock hull cleaning, while ensuring consistency with accepted guidelines and codes of practice. Management strategies may include: <ul style="list-style-type: none"> - Establishment of baseline data relating to introduced species; - Methods for ongoing monitoring; and - Quarantine management / inspection protocols. Prepare and implement Non Endemic Marine Species Management Plan; and Ensure contractors adhere to IMO ballast water exchange. 	<ul style="list-style-type: none"> Australian Quarantine and Inspection Service (AQIS) guidelines for ballast water management; and Australia and New Zealand Environment and Conservation Council (ANZECC) Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance.
Pollution Management									
13	Air – Particulate dust emissions from construction and operational activities	To ensure that atmospheric emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards and that appropriate consideration is given to cumulative impacts.	<ul style="list-style-type: none"> Proposed ground disturbance within study area; All project operations; and Local surrounds of Port Hedland 	<p>In August 2006 BHPBIO was granted an amendment to Ministerial Statement 433 under Section 46 of the EP Act to ensure improvements to dust management at the existing sites and for ongoing expansions. Targets were developed that focused specifically on air quality and visual amenity to measure the success of BHPBIO's dust management program. These targets are outlined in Ministerial Statement 740 (Table 5-1).</p>	<ul style="list-style-type: none"> Nuisance dust emissions during construction period; Temporary adverse impact on visual amenity; Dust deposition on surrounding flora and vegetation; Generation of dust (from ore handling processes including car dumping, transferring, conveying, stockpiling reclaiming and shiploading) leading to community nuisance and potential impacts on health; 	High	<ul style="list-style-type: none"> Undertake a Dust Modelling Assessment to: <ul style="list-style-type: none"> - Develop an atmospheric model; - Identify dust sources; - Predict likely dust emissions; - Describe existing emissions from natural background sources and other Port Hedland sources including 	<ul style="list-style-type: none"> BHPBIO has committed to meeting the Section 46 targets for the Outer Harbour Development. Employ best practise dust management strategies for the construction and operational phase inclusive of: <ul style="list-style-type: none"> - Minimising exposed surfaces; - Adoption of dust suppression measures and other suitable surface stabilisers; 	<ul style="list-style-type: none"> EPA GS No.18; (DEC Air Quality Modelling Guidance Notes (2006); National Environmental Protection Council (NEPC) (1998) Ambient Air Quality National Environment Protection Measure; EPA GS No. 55; and Ministerial Statement 433.

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					<ul style="list-style-type: none"> Increased complaints and loss of community support from increased footprint of dust impacts; and Adverse impact on community aspects including health and heritage issues. 		<ul style="list-style-type: none"> existing BHPBIO operations, proposed BHPBIO operations, PHPA operations inclusive of Utah Point and FMG operations; Evaluate cumulative impacts as a result of the project; and Determine potential impacts and evaluate the results against accepted guidelines, Section 46 targets and statutory requirements. Depositional modelling to determine any potential impacts to areas of heritage significance; and Undertake community consultation and engagement. 	<ul style="list-style-type: none"> Ensure appropriate infrastructure design; Scheduling earthwork activities in areas with due consideration to weather conditions; Locate dusty operations such as crushing at mine sites where practicable; Adopt dust emission targets for the project that meet BHPBIO's current statutory requirements; Rehabilitation of disturbed areas; Additional real time monitoring sites; and Community engagement and liaison with heritage claimant groups. 	
14	Air – Greenhouse Gases	To minimise greenhouse gas emissions to as low as reasonable practicable.	All project operations.	The primary energy source at BHPBIO's existing port operations is electricity. The energy intensity of the port operations for 2007 was 6.7 megajoules/tonne of iron ore shipped. Greenhouse gas intensity was 0.0019 tonnes carbon dioxide equivalent (CO ₂ -e)/tonne of iron ore shipped.	Generation of greenhouse gases.	Medium	<ul style="list-style-type: none"> Conduct a greenhouse gas assessment to: Estimate greenhouse gas emission for both construction and operational phases of the project; Determine areas of potential improvement; Compare estimated emissions and greenhouse gas intensities against BHPBIO's key performance indicators (KPI) and benchmark against other similar operations; and Recommend energy efficient management and mitigation measures. 	<ul style="list-style-type: none"> BHPBIO has committed to reduce its carbon-based energy consumption per tonne of iron ore shipped (energy intensity) by 13% from the 2006 baseline to 2012. BHPBIO has also committed over the same period to reduce greenhouse gas emissions per tonne of iron ore shipped by 6%; The BHP Billiton Iron Ore Energy Excellence Project is the key to achieving these climate change targets and includes identifying energy efficiency improvement opportunities at BHPBIO's operations. The project is also designed to ensure that leading practice and innovation are shared across BHPBIO's operations in order to deliver energy and emission savings; and Identify and implement cleaner production initiatives to increase energy efficiency and minimise greenhouse gas emissions. 	<ul style="list-style-type: none"> EPA GS No. 12; EPA GS No. 55; and EPA Draft GS No. 19.

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15	Groundwater and Surface Water Quality	To maintain the quantity and quality of water so that existing potential environmental values are protected and to minimise the potential for erosion due to concentrated stormwater flow.	<ul style="list-style-type: none"> Stockyard, infrastructure corridor, rail spur and loop, spoil grounds, access roads and auxiliary infrastructure; Construction - stormwater runoff into harbour and local streams; and Operation – stormwater runoff into harbour and local streams. 	<ul style="list-style-type: none"> There are no proclaimed drinking water supply areas within the study area; Water for BHPBIO's existing Port Hedland operations is supplied from the Yule and Navagooie borefields, located some 30 km and 60 km respectively from the project; and Use of water cannons on stockpile areas for dust suppressions. 	<ul style="list-style-type: none"> Potential contamination of water resources from: <ul style="list-style-type: none"> Spills of hazardous materials; Construction wash down practices; and Sewage and effluent disposal from site offices. Sedimentation of land streams and harbour as a result of: <ul style="list-style-type: none"> Off-site discharge of stormwater; and Sedimentation of drainage lines from release of turbid stormwater and erosion. 	Medium	Identify potential contamination sources, pathways and determine management controls required to prevent contamination and manage stormwater.	<ul style="list-style-type: none"> Provide adequate design to prevent contamination of groundwater and surface water; Develop design criteria and associated management to ensure appropriate storage and use of stormwater; Include appropriate number and location of washdown facilities in the design (triple interceptors); Develop design criteria and associated management to ensure appropriate disposal of sewage and other effluent; Employ best practicable measures to manage surface water erosion; and Incorporate best practicable hazardous materials management as outlined in the CEMP. 	<ul style="list-style-type: none"> ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality; EPA Draft GS No. 26; and DoW Water Quality Protection Note WQPN 52 Stormwater Management at Industrial Sites.
16	Marine Water and Sediment Quality	Minimise impacts on sediment, water quality, marine habitat and marine flora and fauna.	Offshore infrastructure, dredging operations, shipping channel, port facilities, jetty and shipping.	<ul style="list-style-type: none"> The proposed dredging is located in an area of high ecological protection (DoE, 2006), which has already been disturbed; The coastal regions of the Pilbara are characterised by turbid waters, especially during periods of spring tides. Tidal range is large, with a maximum of 2–6 m; and Spoil material utilised as source of fill and could potentially comprise ASS. 	<ul style="list-style-type: none"> Turbid sediment plumes during dredging and spoil disposal; Spillage of ore, release of contaminants and wastes from conveying, shiploading and vessels; Introduction of contaminants from shipping including tributyltin (TBT) and other antifoulants; and Discharge of acidic and/or contaminated tail water. 	High	<ul style="list-style-type: none"> Undertake sampling and analysis of marine sediments (within proposed dredge area) to identify presence of potential contaminants and determine sediment particle size; Undertake sediment plume modelling to determine the geographic extent of the proposed plume; Characterise baseline water quality parameters including turbidity (NTU, TSS, SSC) Light (PAR) for a minimum of 12 months, at representative impact and reference sites in State and Commonwealth waters; and Undertake contamination and ASS testing of spoil material identified for disposal to land. 	<ul style="list-style-type: none"> Employ suitable management procedures to minimise impacts of increased turbidity, sedimentation and potential release of contaminants as a result of dredging on BPPH and sensitive marine fauna habitats; Ensure minimal impact on the Port of Hedland and surrounding environment from dredging; Incorporate best practice dredging and construction methods to minimise environmental impact by implementing a DSDMP; Evaluate contractor environmental management procedures and maintenance procedures; Undertake ongoing water quality monitoring of turbidity and light; Develop appropriate contingencies to effectively mitigate impacts upon detection; Ensure wharf design minimises ore spillages; and Manage hydrocarbons and hazardous material in accordance with the CEMP. 	<ul style="list-style-type: none"> ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality; DoE Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (2006); DoE State Water Quality Management Strategy Document No. 6 (2004); and ANZECC National Ocean Disposal Guidelines for Dredged Material (2002).

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17	Hydrocarbon and Hazardous Materials	To ensure that potential impacts associated with hydrocarbon and hazardous wastes are managed to as low as reasonably practicable.	Offshore marine environment that will support the wharf, berth pockets and shipping channel and associated infrastructure.	There are no hydrocarbons or hazardous materials currently stored within the project footprint with the exception of the decommissioning works occurring at the existing HBI Plant.	Contamination of groundwater, surface water or soil from potential spills.	Low	Identify potential contamination sources and pathways.	<ul style="list-style-type: none"> Hazardous materials will be managed in accordance with a CEMP during construction and will focus specifically on the points below: <ul style="list-style-type: none"> Employing safe hydrocarbon handling and storage practices; and Identifying all potential hydrocarbon contamination sources (e.g. dredge cutter gearbox) and apply appropriate controls. Develop Hazardous Materials Management and Spill Response Procedures to ensure appropriate measures are taken to manage: <ul style="list-style-type: none"> Refuelling of the dredge (bunkering); Storage and handling of oils, grease and chemicals; and Breakdown of grease (e.g. use of biodegradable products). Best practise measures will be employed in the management of pesticides. 	<ul style="list-style-type: none"> <i>Environmental Protection (Controlled Waste) Regulations 2004;</i> <i>Environmental Protection (Liquid Waste) Regulations 1996;</i> and <i>Health (Pesticides) Regulations 1996.</i>
18	Solid and Liquid Waste Disposal	To ensure that potential impacts associated with liquid and solid wastes are managed to as low as reasonably practicable.	All project components (construction and operation).	<ul style="list-style-type: none"> There are no solid or liquid waste disposal sites located within the project footprint with the exception of the existing HBI Plant Residue Storage Facility and landfill. These sites are being managed under approved management plans; and BHPBIO has a waste management program for current port operations that covers procedures for the handling, transport and disposal of solid and liquid wastes. 	<ul style="list-style-type: none"> Soil, groundwater and surface water contamination from domestic liquid waste (grey water and sewage) spills or leaks; Litter resulting in adverse impact on visual amenity, impacts on fauna and hygiene; and Additional waste generated for disposal to landfill with limited capacity. 	Medium	Conduct a Waste Study to identify sources, quantities and disposal options.	<ul style="list-style-type: none"> Develop waste management strategies that identify opportunities to avoid and reduce project wastes, ensure appropriate handling, storage, treatment and disposal of wastes; Develop waste management strategies that identify opportunities to avoid and reduce project waste, ensure appropriate handling, storage, treatment and disposal of wastes; and Waste management strategies will be developed in accordance with BHPBIO's standard operating procedures. 	<ul style="list-style-type: none"> Department of Environment, 2005. Review of Waste Classification and Waste Definitions 1996 (As Amended); DEC Guideline for Acceptance of Solid Waste to Landfill (2002); <i>Environmental Protection (Controlled Waste) Regulations 2004;</i> Department of Environmental Protection 2004 guidelines associated with the management of controlled waste; and <i>Environmental Protection (Liquid Waste) Regulations 1996.</i>

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19	Terrestrial Noise and Vibration	To avoid adverse noise impacts to fauna and people. To ensure that noise emanating from the proposed operations (in isolation) complies with statutory requirements.	<ul style="list-style-type: none"> All project components (construction and operation); and The local surrounds of Port Hedland, South Hedland and Wedgefield. 	<ul style="list-style-type: none"> Noise surveys of BHPBIO's Port Hedland operations have been undertaken progressively over the past 6 years, which indicate that environmental noise emissions from existing facilities exceed the assigned noise levels under the <i>Environmental Protection (Noise) Regulations 1997</i>; and BHPBIO have an ongoing commitment to reduce noise emissions at their existing operations and within their current growth framework to as low as reasonably practicable through focus on design, procurement, maintenance and employee awareness. 	<ul style="list-style-type: none"> Nuisance emissions adversely affecting the community; Reduced amenity of nearby residential and recreational areas; and Increase in complaints. 	High	<p>Conduct a Noise Assessment to:</p> <ul style="list-style-type: none"> Identify noise sources (including conveyor drives, traffic, rail, piling, etc); Predict likely noise emissions; Identify opportunities to minimise noise emissions; Evaluate noise emissions resulting from the project in isolation; and Model noise impacts on sensitive receptors from the proposal in isolation and cumulatively with other sources including impacts from associated increase in rail and traffic noise. 	<ul style="list-style-type: none"> Ensure the design considers (with relevance to noise): <ul style="list-style-type: none"> Stockyard orientation and location/elevation of noisy items; Noise attenuation measures (e.g. low noise idlers, cladding, enclosures); and Update the existing BHPBIO Noise Management Plan for the construction and operation phase. Implement noise management construction practices; Establish a complaint 'hotline' and manage complaints in accordance with existing BHPBIO procedures; and Evaluation of rail alignment options to incorporate noise attenuation controls and measures e.g. rail speed, lubricants, barriers, separation distance. 	<ul style="list-style-type: none"> EPA Draft GS No. 8; <i>Environmental Protection (Noise) Regulations 1997</i>; WAPC Draft Statement of Planning Policy: Road and Rail Transport Noise 2005; and EPA GS No. 55.
20	Marine Noise, Blasting and Vibration	To avoid adverse noise impacts to terrestrial and marine fauna and people and to ensure that noise emanating from the facilities comply with statutory requirements.	<ul style="list-style-type: none"> Dredging and blasting operations, offshore infrastructure, port facilities and shipping; and Pile driving for the jetty and wharfs. 	<ul style="list-style-type: none"> Existing operations currently emit marine noise within the Port Hedland harbour from the following sources: <ul style="list-style-type: none"> Shipping movements; and Construction activities (e.g. piling, dredging). 	<ul style="list-style-type: none"> Behavioural modification to marine fauna; Physiological damage from blasting and construction activities (piling, blasting and dredging); and Reduced amenity of recreational areas and community nuisance. 	High	<ul style="list-style-type: none"> Conduct noise emission modelling and establish baseline noise data for marine environment; Conduct a marine noise and vibration assessment to: <ul style="list-style-type: none"> Identify marine fauna at risk and extent of impacts; Determine potential noise and vibration impacts from dredging, blasting, piling and shipping; and Establish management strategies to minimise any significant impacts. Establish tolerance limits of sensitive marine fauna. 	<ul style="list-style-type: none"> Employ best practice measure to minimise noise emissions to as low as reasonable practicable; Implement management measures (e.g. marine fauna watches) to reduce risk of significant impacts to marine fauna; Restrict construction hours for noise generating activities; and Monitor construction noise impacts. 	<ul style="list-style-type: none"> EPA GS 8; and Interactions with Cetaceans – Section 8.1 of the EPBC Regulations (2000).

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21	Light	To avoid or manage potential impacts from light overspill and comply with acceptable standards.	Port facilities and wharf infrastructure.	Existing Port facilities that contribute to light spill in the area include existing BHPBIO operations at Nelson Point and Finucane Island, FMG and PHPA operations.	Adversely affect the navigation of turtles and other marine fauna.	High	<p>Conduct a Light Impact Assessment to:</p> <ul style="list-style-type: none"> Identify sources and type of light and existing levels of light spill; Model the light spill from the project infrastructure based on the additive effects of the existing and the proposed facilities on areas of interest; Model the cumulative light spill of surrounding projects; Comment on light spill resulting from the project; Predict potential impacts on visual amenity, turtles and other significant marine and terrestrial fauna; and Determine management strategies to minimise light spill and glow. 	<ul style="list-style-type: none"> Ensure the design considers the use of 'best available technology' to reduce effects of lighting to 'as low as reasonably practicable'; and Restrict direct lighting to operating areas through the use of shields and incorporating best available designs. 	<ul style="list-style-type: none"> EPA Draft GS No. 33; and AS 4282 – 1997. Control of Obtrusive Effects of Outdoor Lighting.
Social Surroundings									
22	Fisheries	To minimise impacts on recreational and other fisheries.	Offshore infrastructure, dredging operations, shipping channel and shipping.	Whilst there are no significant commercial pelagic fisheries operating in the immediate nearshore vicinity of Port Hedland, three other industries have been identified to date including a pearl industry, aquaculture facilities and a mud crab industry.	<ul style="list-style-type: none"> Disruption to these fisheries could result from restriction of access to fishing grounds; and Direct and indirect effects of noise disturbance on target fish or fish prey species. 	Medium	<ul style="list-style-type: none"> Liaise with relevant fishing groups and relevant stakeholders; Conduct a fisheries study to include: <ul style="list-style-type: none"> Identification of recreational, commercial fisheries; Assessment of aquaculture operations within the vicinity of the development area; and Identification key commercial species. Undertake seasonal characteristics and identification of any significant issues for consideration in project design. 	<ul style="list-style-type: none"> Employ mitigation measures after consultation with relevant stakeholders; Liaise with commercial fisheries in the area; and Comply with Australian Maritime Safety Authority (AMSA) administered marine safety regulations and marine notification requirements. 	<i>Australian Maritime Safety Authority Act 1990.</i>

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23	Aboriginal Heritage	To ensure that the proposal complies with the requirements of the <i>Aboriginal Heritage Act 1972</i> .	All project components.	Comprehensive archaeological and ethnographic surveys have been completed over substantive parts of the study area including Boodarie, Finucane Island and along the proposed infrastructure corridor. Sixty archaeological sites and four potential ethnographic sites have been identified within the areas surveyed.	Direct and indirect impacts on Aboriginal sites of cultural significance.	High	Archaeological and ethnographic surveys will be conducted over the study area. Relevant local Aboriginal groups and representatives will be consulted.	<ul style="list-style-type: none"> Evaluate the results of the heritage surveys and where appropriate utilise the results to optimise the design and layout of the project infrastructure; Potential Impacts and management on Aboriginal heritage sites will be discussed with relevant Aboriginal groups and the Department of Indigenous Affairs, and approval sought in accordance with the <i>Aboriginal Heritage Act 1972</i>; and Develop and implement Cultural Heritage Management Procedures. 	<ul style="list-style-type: none"> EPA GS No. 41; and <i>Aboriginal Heritage Act 1972</i>.
24	European Heritage	<ul style="list-style-type: none"> To ensure that the proposal complies with the requirements of the <i>Heritage of Western Australia Act 1990</i> and commonwealth requirements; and Ensure changes to biological and physical environment resulting from the project do not adversely affect cultural associations with the area. 	All project components.	<ul style="list-style-type: none"> A search of the Australian Heritage Database (DEWHA website) was conducted for the Port Hedland area. The search included the Register of National Estate, Commonwealth Heritage List, National Heritage List, World Heritage List and the List of Overseas Places of Historic Significance to Australia; and The database search identified one heritage place of potential interest to the project which is the 'Coastal Islands from Dixon Island, Cape Preston to Cape Keraudren, Port Hedland' area. This area is listed on the Register of the National Estate as being an Indicative Place (Place ID 17917). This area was nominated as an "Important representation of intact tidal flats and mangrove thicket of the north west coast of Western Australia, very important in supplying nutrients for the adjacent marine ecosystem and important habitat for juveniles of many marine species" (DEWHA, 2008). 	Inadvertent disturbance of culturally significant sites.	Medium	<ul style="list-style-type: none"> Complete a desktop review of non-indigenous heritage surveys including maritime heritage sites; Identify any heritage sites listed on the Register of National Estate, the State Heritage Council's Register of Sites and the local Municipal Inventory; and Finalise and implement a Community Engagement and Consultation Plan. 	<ul style="list-style-type: none"> Evaluate the results of the heritage surveys and where appropriate utilise the results to optimise the design and layout of the project infrastructure. 	Register of the National Estate and the Register of the Heritage Council WA.

No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
25	Social Impacts	To minimise the impacts to the local community, the social profile and all services and facilities.	Town of Port Hedland.	<ul style="list-style-type: none"> The proposed community consultation strategy and social impact assessment approach is discussed in more detail in Section 6; and Existing social issues within the Port Hedland community have been thoroughly documented and are well understood by BHPBIO. These issues will be addressed in detail through BHPBIO's social impact assessment. 	<p>The physical presence and associated activities has the potential to positively and negatively affect the social profile of Port Hedland. This may include impacts from:</p> <ul style="list-style-type: none"> Additional traffic movements for the transport of goods and services; and Potential safety and amenity impacts; Generation of local employment opportunities; Increased pressure on local accommodation, housing, community services and facilities; and Increased incidents of mosquito-borne diseases. 	High	Conduct a Social Impact Assessment of the overall growth strategy of the project.	<ul style="list-style-type: none"> Identify and implement strategies to positively contribute to the local and regional socio-economic profile; Minimise adverse effects as far as reasonably practicable; Minimise noise and dust impacts – refer to relevant sections; Develop and implement a Traffic Management Procedures; Mitigation strategy to be developed following outcomes of the social Impact Assessment, and in liaison with the Department of Health and other allied services; Implement outcomes of SIA process to assist community to grow at a rate where sufficient support is provided to the residential population; Compliance with BHPBIO Standards 7 and 8 (refer to Section 9.12); and Employ appropriate mosquito mitigation measures to minimise water ponding. 	<ul style="list-style-type: none"> DoE, Interim Industry Guide to Community Involvement, December 2003; and DoH, Mosquito Management.
26	Visual Amenity	To minimise impacts on the visual amenity of the area adjacent to the project.	All project components.	<p>The existing visual surroundings within and around Port Hedland consist of:</p> <ul style="list-style-type: none"> Residential areas and public services; Light industrial areas; Port infrastructure (BHPBIO and third parties); Existing HBI Plant; Pastoral stations; and Expanses of undeveloped land. 	<ul style="list-style-type: none"> The physical presence and the proposed change to the landscape has the potential to affect the public visual amenity of the study area; and Project infrastructure will be visible from the popular recreational area at Finucane Island. 	Medium	Conduct a visual amenity assessment to describe the prominent features of the existing landscape and determine the visual impacts of the project during day and night time operations.	<ul style="list-style-type: none"> Practicable measures will be implemented to design and operate facilities to minimise impact on visual amenity; Use visual methods to physically demonstrate visual impacts; Investigate construction of visual screening near recreational areas, e.g. bunds, tree screens, design of lighting; and Construction and rehabilitate environmental bunds at dredge reclaim areas to shield views of operations. 	<ul style="list-style-type: none"> EPA, Draft GS No.33; and Guidelines for Landscape and Visual Impact Assessment (UK Landscape Institute/UK Institute of Environmental Assessment and Management, 2002).
27	Recreation	To minimise impacts of the project on recreational areas.	Project components in coastal area.	<ul style="list-style-type: none"> A number of recreational features considered to be of value to the community are located within the project footprint including: <ul style="list-style-type: none"> The public access road to Finucane Island; The public boat ramp on Finucane Island; Public beaches; and The surrounding coastline 	<ul style="list-style-type: none"> Access to some coastal areas used for recreation may be restricted by construction and operation activities; and The increasing demand for local services resulting from increases in workforce numbers may restrict access to local services by tourists. 	Medium	Conduct a Social Impact Assessment to: <ul style="list-style-type: none"> Identify the recreational areas within the proximity to the study area; and Determine the potential impacts. 	<ul style="list-style-type: none"> Maintain the existing level of recreational areas in the local area; and Consult with the community to develop appropriate management measures. 	

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No	Environmental Factor	Environmental Objective	Relevant Area	Existing Environment	Potential Impacts	Impact Significance	Investigations Required	Potential Mitigation Strategies and Management Mechanism	Relevant Guidance
				<p>widely used by recreational fishers and boaters.</p> <ul style="list-style-type: none"> Tourism is also an expanding industry in the Pilbara region and as one of the largest towns; Port Hedland is a hub for flights, accommodation and other services. 					
Other									
28	Decommissioning	To ensure that infrastructure and facilities are decommissioned and/or the site rehabilitated in accordance with accepted guidelines at the time of decommissioning.	All project components.	BHP Billiton has a comprehensive Closure Standard that applies to all operations. This Standard will be applied to the proposed development to identify and develop suitable closure and decommissioning plans.	<ul style="list-style-type: none"> Unsafe conditions following the closure of the Port operations; and Poor sediment and surface water conditions; and Ongoing liability. 	Low	<ul style="list-style-type: none"> A Preliminary Closure and Decommissioning Strategy will be established to outline the approach of the closure planning process in accordance with closure standards; Decommissioning and Closure planning will be conducted with detailed closure planning occurring in advance of decommissioning and closure. This will be conducted in accordance with BHPBIO's standard management procedures; and Comply with closure standards and contaminated site regulations. 	Decommissioning and Closure planning will be conducted as a staged process with detailed closure planning occurring well in advance of decommissioning and closure and in accordance with BHPBIO's standard management procedures.	<ul style="list-style-type: none"> IMO Guidelines for removal of offshore installations (1989); Minerals Council of Australia (2000) Strategic Framework for Mine Closure; BHPBIO Closure Standard (2004); and DEC <i>Contaminated Sites Act 2003</i>.

8 POTENTIAL ENVIRONMENTAL IMPACT INVESTIGATIONS AND MITIGATION STRATEGIES

8.1 RELEVANT ENVIRONMENTAL AND SOCIO-ECONOMIC FACTORS

Based on the factors identified within Table 7-2 and the potential impacts, the key environmental and socio-economic factors that are considered to be of greatest importance (high importance) for the proposed Outer Harbour Development include:

- Impacts from clearing on terrestrial flora and fauna (Section 8.4.1 and 8.4.2);
- Terrestrial noise and vibration emissions from rail and port related activities, equipment and associated cumulative impacts (Section 8.4.3);
- Air quality management, specifically dust emissions from the stockyards and associated cumulative impacts (Section 8.4.4);
- Marine impacts including the degradation of marine water and sediment quality, loss of mangroves and other benthic primary producers, impact on marine flora and fauna as a direct and indirect result of dredging, and construction of project infrastructure (Sections 8.5.1, 8.5.2, 8.5.3 and 8.5.4);
- Marine noise and vibration (Section 8.5.5);
- Light emissions (Section 8.6);
- Aboriginal heritage (Section 8.7); and
- Social impacts (Section 8.8).

Not all potential environmental factors will be of high importance (Table 7-2), therefore these factors may not warrant detailed assessment in the PER/EIS. Nonetheless, these will be investigated and the scope of such investigations is provided in Appendix F. Factors considered of medium importance include:

- Subterranean fauna;
- Surface water flows;
- Groundwater and surface water quality;
- Intertidal and subtidal BPPH;
- Hydrodynamics and coastal processes;
- Non-endemic marine species;
- Air quality – greenhouse gases;
- Geology, soils and landforms;
- Solid and liquid waste disposal;
- Fisheries;
- Visual amenity;
- European heritage; and
- Recreation.

Factors considered of low importance will not be covered in great detail in this PER/EIS. The studies outlined below will be undertaken for the lower importance impacts. These studies are not described in full in this document, for the above reason, and the results will be summarised in the PER/EIS:

- Hydrocarbon and hazardous materials; and
- Decommissioning and rehabilitation.

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For each factor a number of potential mitigation strategies have been included, these will be refined once baseline surveys, modelling and engineering design have been completed and presented in detail in the PER/EIS.

8.2 SCOPE OF WORKS

A scope of works for the factors outlined as having high significance in Section 7 is detailed in this section.

The proposed schedule for commencement of key environmental baseline technical studies is provided in Table 8-1. A number of key technical studies have already commenced in order to gather sufficient baseline data to support the impact assessment process and align with project schedules. These will be supported by a stakeholder consultation program and social impact assessment.

The results of all technical studies and proposed management strategies will be presented and discussed in detail in the PER/EIS. A list of measurable and auditable objectives and targets will also be provided in the PER/EIS for proposed activities that pose the greatest risk for significant environmental impact (high and medium factors), for example dredging and spoil disposal.

Table 8-1 Project Schedule for Key Environmental Studies

Key Environmental Studies	Commencement Date	Completion Date
Terrestrial Flora and Fauna Studies	October 2007	October 2008
Terrestrial Subterranean Fauna	June 2008	September 2008
Terrestrial Noise Assessment	October 2007	October 2008
Air Quality/Dust Assessment	October 2007	October 2008
Aboriginal Heritage Surveys	December 2007	June 2008
Marine Noise, Blasting and Vibration Assessment	June 2008	November 2008
Marine Fauna Desktop Assessments*	July 2008	October 2008
Benthic Primary Producer Habitat Assessment	December 2007	October 2008
Marine Water Quality and Coral Health Monitoring**	May 2008	Ongoing
Marine Hydrodynamic (Plume dispersion) Modelling	May 2008	November 2008
Sampling and Analysis Plan (SAP)	December 2007	November 2008

*Marine Turtle field work will be conducted in the summer months of 2009 during the turtle breeding season.

**The Baseline Water Quality and Coral Health Monitoring field work will continue on an ongoing basis until dredging commences.

8.3 DEFINING STUDY AREA

The area subject to environmental investigations as part of this environmental impact assessment process is illustrated in Figure 8-1 and Figure 8-2.

The study area encompasses the direct project footprint (including options currently being assessed), the immediate surrounds and areas which may potentially be impacted by the project.

The terrestrial study area comprises of areas where the rail spur and loop, stockyards and materials handling infrastructure and the overland conveyor will be located. The marine study area stretches from Cape Thouin in the west to North Turtle Island in the east. The marine study area has been selected based on a predicted potential zone of influence estimated on conceptual engineering design of wharf, associated dredging locations and volumes and potential spoil disposal areas.

8.4 TERRESTRIAL

8.4.1 Terrestrial Flora and Vegetation

Ground disturbance and clearing will directly impact on flora and vegetation within the proposed study area. Seasonal biological surveys of the study area will meet the requirements of the EPA Position Statement Number 3 "Terrestrial Biological Surveys as an Element of Biodiversity Protection" and EPA Draft Guidance Statement No. 51 "Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia".

The scope of the Terrestrial Flora and Vegetation Assessment includes:

- A review of previous flora and vegetation survey information for the Port Hedland area;
- Conducting seasonal field surveys over the study area to identify, assess and map flora and vegetation communities occurring and having the potential to occur;
- Identification of the presence of Priority Flora and Declared Rare Flora;
- Identification of the presence of Threatened Ecological Communities;
- Identification of vegetation communities of conservation significance;
- Conducting an impact assessment with reference to the proposed project footprint and activities, and local and regional significance of flora species; and
- Identification of management strategies to minimise the impact on flora and vegetation.

In accordance with the EPA Guidance Statement No. 51, seasonal flora and vegetation surveys have been completed. ENV Australia completed a summer fauna survey in October 2007 and a winter survey in June 2008. To date no DRF species have been identified. Potential management and mitigation measures to conserve flora and vegetation of conservation significance include:

- Where possible avoid disturbance in areas where priority species have been identified;
- Clearing operations will be kept to a minimum;
- Boundaries of areas will be clearly demarcated;
- Current access roads will be used where possible;
- Areas of disturbance will be rehabilitated where appropriate;
- Workforce will be educated on the presence of priority species;
- Regular monitoring of disturbed areas will be undertaken;
- Dust and waste will be managed to avoid secondary impacts;
- All heavy vehicle and machinery will be cleaned appropriately to prevent the spread of introduced weeds; and
- Fire management plans will be implemented.

FIGURE 5
PORT HEDLAND OUTER HARBOUR DEVELOPMENT
Environmental Study Area - Terrestrial

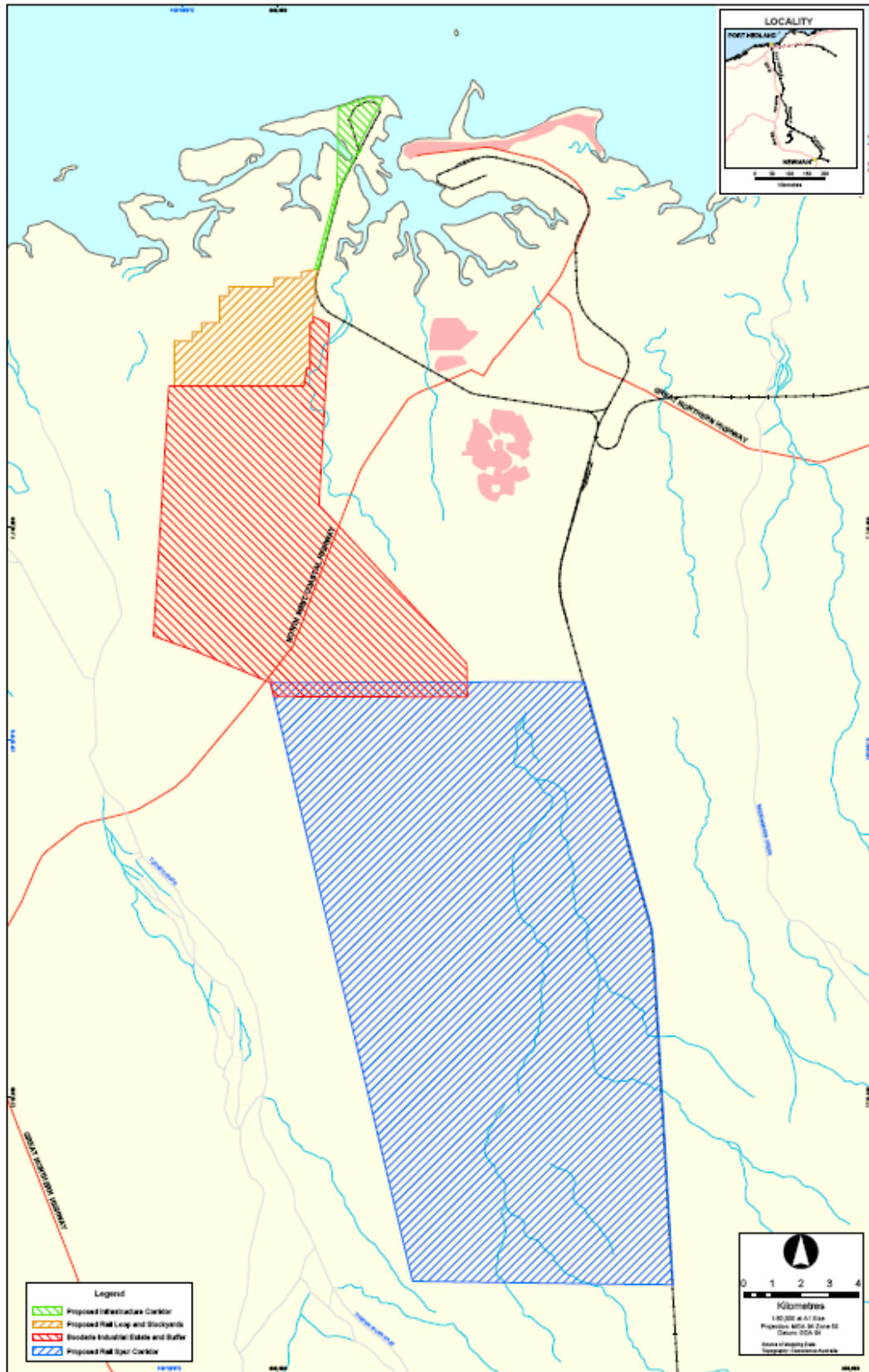


Figure 8-1 Environmental Study Area – Terrestrial

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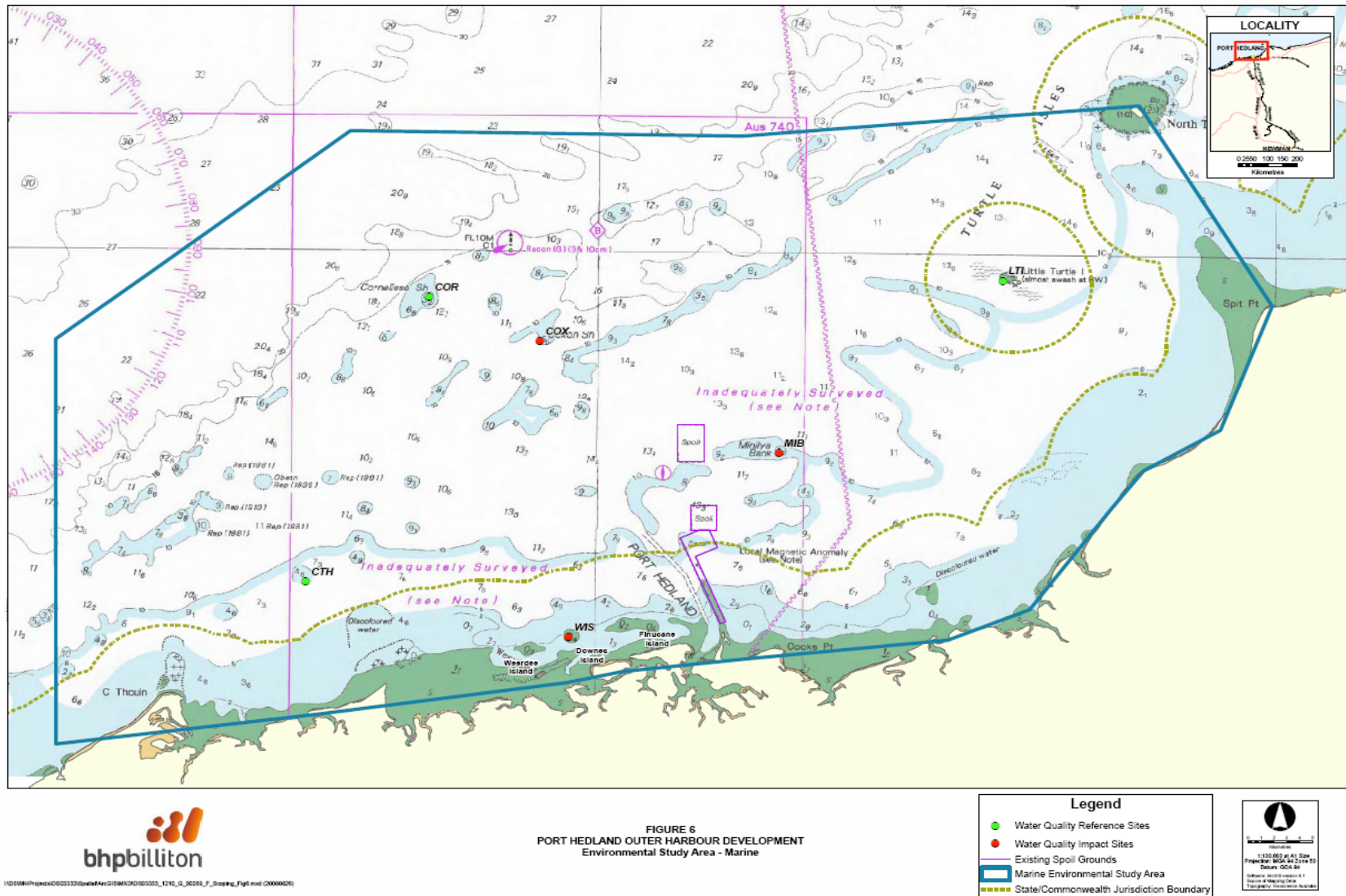


Figure 8-2 Environmental Study Area – Marine

8.4.2 Terrestrial Fauna

Ground disturbance and clearing will directly impact on fauna (inclusive of short range endemic fauna (SRE)) or fauna habitats within the project footprint. Seasonal biological surveys of the study area will meet the requirements of the EPA Guidance Statement Number 56 "Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia".

The scope of the Terrestrial Fauna Assessment (inclusive of SRE) includes:

- A review of previous fauna survey information for the Port Hedland area;
- Identification and assessment of fauna occurring over land systems represented in the review of Conservation and Land Management (CALM) and WA Museum fauna databases;
- Conducting seasonal field surveys over the study area to identify and assess fauna habitats, fauna occurring and having the potential to occur;
- A habitat assessment including mapping of fauna habitats and identification of those of conservation significance;
- A seasonal vertebrate trapping program including a variety of trapping methods (e.g. Elliot and Pitfall traps);
- Opportunistic diurnal and nocturnal searches for fauna;
- A seasonal ornithological census;
- Seasonal acoustic bat echolocation recordings;
- Targeted searches for SRE species within potential SRE habitat;
- Providing fauna species lists (including introduced species) for mammals, avifauna, reptiles, amphibians and SRE that are present or have the potential to occur within the study areas;
- Undertaking a search for protected fauna (under the EPBC Act, Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) or the Department of Conservation and Land Management Wildlife Conservation Notice) that may occur;
- Determining preferred habitats and occurrence of protected fauna in a regional context utilising existing data and records and presence of appropriate habitat;
- Conducting an impact assessment with reference to the proposed project footprint and activities, and local and regional significance of fauna species and habitats; and
- Identification of management strategies to minimise the impact on fauna and significant habitat areas.

In accordance with the EPA Guidance Statement No. 56, seasonal vertebrate fauna surveys have been completed. ENV Australia completed a summer fauna survey in October 2007 and a winter survey in June 2008. ENV Australia have also completed SRE surveys representative of summer and winter. Potential management and mitigation measures to conserve fauna of conservation significance include:

- Impacts on mangroves will be minimised were possible to alleviate negative impacts on species of conservation significance;
- Clearing of high value habitats will be avoided were possible;
- Rail infrastructure will include culverts to allow for fauna movement;
- Were possible sand embankments will be retained; and
- Natural breeding habitats will be conserved.

8.4.3 Terrestrial Noise and Vibration

A noise and vibration assessment will be conducted for the Outer Harbour Development to determine the possible impacts of noise generating activities on people and public amenity. The noise assessment inclusive of permanent infrastructure and traffic and rail noise will take into consideration the:

- Environmental Protection (Noise) Regulations 1997; and
- The Western Australian Planning Commission Draft Statement of Planning Policy: Road and Rail Transport Noise (2005).

The modelling assessment will consider cumulative impacts of other existing and proposed operations contributing to noise emissions in the area, in addition to assessing the emissions resulting from the project in isolation.

The key sensitive receptors that will be used in the noise assessment include:

- Brearley St;
- Hospital;
- Laurentis Point;
- Police Station;
- Pretty Pool;
- South Hedland; and
- Wedgefield Industrial Estate.

Proximity of proposed infrastructure to sensitive receptors will be determined following selection of preferred options and detailed in the PER/EIS. A series of studies will be commissioned to investigate different infrastructure configurations and associated potential impacts associated with those options.

Outcomes from the Noise and Vibration Assessments will be utilised in the design, to ensure noise emissions from the Outer Harbour Development are minimised to as low as practicable.

The noise assessment study will be progressed in parallel with engineering design. The scope includes:

- Establishing a baseline environmental noise model for existing noise levels at sensitive receptors;
- Identifying sources of noise and vibration from construction and operation activities;
- Identifying nearest social and environment noise sensitive receivers within and immediately surrounding the project area;
- Emission modelling considering worst-case and average-case meteorological conditions, assessing the project in isolation and cumulative contributions from other (existing and approved subject to data availability) industries in the Port Hedland area;
- Impact and assessment of road (truck) and rail traffic noise and vibration;
- Assessment of construction noise and vibration; and
- Identifying opportunities for the attenuation of noise impacts on noise sensitive areas surrounding the project including Port Hedland, South Hedland and Wedgefield.

Results from the noise modelling will be used to update BHPBIO's existing Noise Reduction Management Plan and ensure that the proposal complies with legislation when considered in isolation.

Potential noise management and mitigation measures to be considered in BHPBIO's Noise Reduction Management Plan include:

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- Installing low noise idlers;
- Increasing idler roller size of the conveyors; and
- Enclosing the conveyors (shield, barriers and cladding).

8.4.4 Dust Assessment

An impact assessment will be completed in accordance with the DEC Air Quality Guidelines to ensure that dust levels meet acceptable standards including BHPBIO's targets nominated in Ministerial Statement 740 (Section 5.1).

The modelling assessment will incorporate BHPBIO's existing and proposed operations contributing to dust emissions in the area, in addition to assessing the emissions resulting from the Outer Harbour Development in isolation.

The proposed dust assessment will be progressed in parallel with engineering design and will include design, operational and response components. In relation to the design components, investigations will be completed to ensure the engineering design is optimised to minimise dust emissions and ensure the Ministerial Statement 740 targets are met. The scope of the assessment includes:

- Identification of dust sources during construction and operations and best practice management strategies required to minimise emissions;
- Identification of sensitive receptors;
- Characterisation of the dust content of the various types of ore and optimum ore moisture conditioning;
- Analysis of BHPBIO monitoring data for TSP and PM₁₀;
- On-site measurement of emissions to confirm previous modelling assumptions;
- Compilation of source emission files for the proposed Outer Harbour Development stockyards;
- Compilation of source emission files of additional proposed operations within the Port Hedland area to allow for a cumulative impact assessment;
- Atmospheric dispersion modelling to determine the potential impacts from both existing and future BHPBIO operations as well as the cumulative impacts from additional operations;
- Depositional modelling to determine any potential impacts to heritage locations; and
- Identification of dust emission controls and management strategies.

The modelling will include existing and proposed BHPBIO operations. A cumulative assessment including other operations such as FMG at Anderson Point (at 45 Mtpa) and PHPA operations at Utah Point will also be undertaken to predict potential cumulative emissions from several sources at sensitive receptors. The dust modelling assessment will outline results for scenarios based on 24hr average of PM₁₀ at 50ug/m³ level as well as the 24hr average of the PM₁₀ at the 70ug/m³ level.

Appropriate measures will be adopted in the design of the Outer Harbour Development infrastructure to ensure dust levels comply with Ministerial Statement 740. BHPBIO will consider on-site and offsite strategies that best achieve dust targets from a business-wide approach including BHPBIO's existing port operations.

Potential dust management and mitigation measures to be considered in the Dust Management Plan include:

- Car dumpers will be enclosed in buildings;
- Water canon on all stockpiles;
- Ore conditioning at transfer stations;
- Dust extraction at transfer stations;

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- Dust extraction at lump rescreening plant (LRP); and
- Belt wash system on conveyors.

8.5 MARINE STUDIES

Numerous marine investigations are proposed in order to achieve an understanding of the marine environment and potential impacts related to the proposed development. These investigations will include the following components:

- Benthic Primary Producing Habitat mapping (Appendix F);
- Sediment plume dispersion and re-suspension modelling (Section 8.5.1);
- Water quality monitoring (Section 8.5.2);
- Coral health monitoring (Section 8.5.2);
- Sediment characterisation (Section 8.5.3);
- Marine fauna assessment (Section 8.5.4);
- Marine noise and vibration assessment (Section 8.5.5); and
- Coastal processes assessment (Appendix F).

The scope and design of investigations related to those factors listed above which are considered of high importance are described in detail below. Investigations related to factors of medium importance are summarised in Appendix F. Any management measures discussed in these sections are indicative only and will be refined and expanded in the PER/EIS or management plans.

8.5.1 Sediment Plume Dispersion and Resuspension Modelling

A dredge plume dispersion and re-suspension model will be used to predict the fate of sediment mobilised from the shipping channel, berth pockets (wharf) and turning basins during dredging and similarly at the spoil disposal locations. A recognised leader in numerical dredge plume modelling will be engaged to conduct the modelling and provide output which illustrates the zones of elevated total suspended solids (TSS). A second numerical modeller will be engaged to review and verify the veracity of the model. Where relevant and available, BHPBIO will take into consideration information from previous dredging programmes undertaken within the Port Hedland area in developing the dredge model. The levels of TSS used to define zones of potential impact/influence on BPPH will be developed in consultation with regulatory authorities. Modelling will be based on information including particle size distribution (PSD) of sediment to dredge depth collected at numerous locations within and nearby the proposed footprint, hydrodynamic & atmospheric information, and the proposed dredge logs which detail dredge and spoil disposal activities in defined time intervals.

The model will predict the resultant accumulation of material on the seabed, concentrations and duration of suspended particulates in the water column. The model output will be mapped to define the extent of the turbidity plume and sediment deposition, above thresholds related to environmental sensitivities. Inputs into the sediment plume model will include:

- Detailed infrastructure designs/layouts;
- Dredging footprint, volumes and depths;
- Spoil disposal locations and associated disposal volumes;
- Seabed/dredge spoil characteristics including particle size distribution, material hardness and settling rates (results from geotechnical investigations and pilot sediment characterisation study);
- Bathymetric data;
- Wind and wave climate data collected to date to account for seasonal variations;

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- Water quality data (TSS and turbidity) collected fortnightly to date to account for seasonal variations;
- Dredging methodology/dredge types;
- Dredge Production Rates (m³/day);
 - Duration of dredging campaign and various seasons of operation; and
 - Model assumptions and methodology will be clearly documented within the PER/EIS.

Results of the modelling will assist in the development of a DSDMP which will ensure that dredging is managed to minimise environmental impact to sensitive benthic resources. This plan will be appended to the PER/EIS document. The objectives of the DSDMP are to:

- Identify potential impacts related to the dredging program including any impacts to benthic habitats and sensitive marine fauna habitats;
- Identify the effectiveness of different management measures and employ best practice procedures to ensure environmental impacts are being minimised;
- Develop appropriate contingencies to effectively mitigate negative impacts upon detection;
- Provide a monitoring program so that adverse environmental effects to sensitive resources are detected as early as possible;
- Outline reporting requirements for reporting progress of dredging and any environmental issues during the dredging program promptly to the DEC, DEWHA and the PHPA; and
- Details of validation of the numerical modelling results, during an early stage of the dredging and again following completion of dredging.

Potential management measures may include:

- The suspension of dredging activities if daily TSS levels exceed established site specific threshold values for BPPH;
- The suspension of dredging during periods of known coral spawning;
- The employment of experienced operators for dredging works;
- Mitigation measures to minimise overflow during loading in minimised;
- Maintenance of dredging equipment to minimise leakage;
- Water quality monitoring prior to and during dredging activities;
- Development and implementation of water quality trigger levels; and
- Contingency water quality mitigation measures.

BHPBIO are considering the option of dredging spoil reclamation. Limited detail is presently available to assess the alternative comprehensively. BHPBIO are undertaking further engineering and environmental studies to investigate this opportunity.

8.5.2 Water Quality and Coral Health Monitoring

Typically, the three main potential impacts of dredging on water quality are related to:

- The potential release of in-sediment contaminants;
- The effects of turbidity that may impact on marine species that are dependent on light; and
- Sedimentation of suspended material on benthic biota.

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BHPBIO acknowledges the 'Pilbara Coastal Water Quality Consultation Outcomes – Environmental Values and Environmental Quality Objectives' document (DoE 2006) which outlines possible zones of ecological protection within State waters.

BHPBIO will consult with the EPA in determining the most appropriate level of ecological protection for the port operations and the extent to which the proposal will meet the current established zones of ecological protection.

Water quality and coral health data will be collected for a minimum 12 month period prior to the commencement of dredging activities and will assist in meeting several objectives, including:

- Demonstrating an understanding of the existing environment, as part of the site selection process (a requirement of EPA Guidance Statement No. 29);
- Providing necessary data on the intensity, duration, and frequency (IDF) of water quality events (e.g. increased turbidity and reduced light) that will assist in the development of tolerance thresholds relative to subtidal BPPH;
- Providing necessary data on the IDF of water quality events (e.g. increased turbidity, light climate and temperature) that will assist in the development of trigger values used in monitoring associated with the DSDMP;
- Contributing to numerical modelling exercises to predict potential zones of impact/stress and determine the potential effects of the proposed works to BPPH in the marine environment; and
- Enabling comparisons between water quality conditions and BPPH within the Port Hedland region to other locations where similar data has been collected; and
- Providing necessary data for the sediment plume dispersion modelling (Section 8.5.1).

The “baseline” water quality data will be collected over an initial period of 12 months for inclusion in modelling and continued until dredging commences, with loggers changed over on approximately a fortnightly basis. Baseline data gathered over that period will include:

- Light climate;
- Turbidity;
- Temperature; and
- Sedimentation.

Coral health monitoring will be conducted concurrently at the water quality monitoring sites during the baseline period, for a minimum of 12 months prior to the dredging program.

At each site, approximately 60 hard coral colonies will be tagged and monitored to develop an understanding of natural, seasonal environmental influences on the corals over time. This will generate an understanding of naturally occurring coral stressors which will assist in development of site specific water quality threshold values.

Corals will be monitored by divers using in-water coral colour charts designed by the Great Barrier Reef Marine Park Authority (GBRMPA). This will provide a visual estimation of coral colour *in situ*. In addition digital photographs incorporating the coral colonies and a colour chart designed in conjunction with geographic information systems (GIS) software will allow computer analysis of coral colour, thus removing the human and environmental variables from the observation.

Turbidity and light are the water quality parameters which are most likely to be affected during dredging. Given the latitude of Port Hedland, it is also proposed to monitor changes in water temperature, as corals and other benthic resources may be sensitive to thermal stress. Should corals be bleached during the project, this type of information will be critical in separating natural events (the effects of temperature changes) from those that may be related to dredge activities.

To collect baseline information water quality and coral health monitoring sites were deployed in May 2008 at six locations within the nearshore (State waters) and offshore (Commonwealth waters) areas of Port Hedland (refer to Figure 8-2):

The sites were selected based upon:

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- Outcomes of preliminary plume modelling that delineated a spatial extent of evaluated TSS levels;
- Observations from field BPPH surveys undertaken over the study area; and
- Location, for example being nearshore, midshore and offshore.
- Monitoring sites within the potential zone of elevated TSS are designated as 'impact' sites, whilst those outside are designated as 'reference' sites. This is summarised in Table 8-2.

Table 8-2 Water quality monitoring sites, offshore from Port Hedland

Site Name	Location ₁	Likely site status based on early plume modelling
Cape Thouin	Nearshore	Reference
Weerde Island	Nearshore	Impact
Little Turtle Island	Mid-shore	Reference
Minilya Bank	Mid-shore	Impact
Cornelisse Shoal	Offshore	Reference
Coxon Shoal	Offshore	Impact

1. refer to Figure 8-2.

As the dredge program and associated plume modelling is further refined, the location of the monitoring sites will be reviewed and amended as required. If the plume is predicted to be further widespread than the current distribution of the proposed water quality monitoring sites, additional sites will be required to serve as reference sites (i.e. not affected by the dredge plume). This will be discussed in detail in the PER/EIS document.

8.5.3 Characterisation of Marine Sediments

Prior to dredging and commencement of spoil disposal, the dredged material will be characterised for potential contaminants that may be released when disturbed and relocated. The SAP will be in accordance with the NODGDM (EA 2002).

Execution of the pilot SAP will involve four steps:

- A SAP proposal will define the number of sample sites, the depth of sampling, and the contaminants to be tested and will be submitted to DEWHA for approval. Information from previous sediment contamination studies in the vicinity of the area to be dredged will be utilised in preparing the SAP proposal.
- Implementation of the SAP in the field will involve the collection of sediment cores by diving and drilling methods, and appropriate mixing and storage of samples for contaminant analysis;
- Analysis of samples for contamination by a National Accredited Testing Association (NATA) accredited laboratory; and
- Preparation of a report that explains the analysis results, the implications of the results and any further sampling and analysis that will be required to satisfy regulatory requirements.

Part of the SAP process included a pilot study to investigate existing information in the area of proposed dredging potential spoil grounds. A pilot study was undertaken to:

- Allow the design process to optimise the location of maritime infrastructure and potential spoil grounds; and
- Design a suitable SAP that is based on the results of the pilot study.

The pilot study has identified potential contaminants of concern within Port Hedland harbour that were sampled by numerous proponents over the last 15 years. Sediment sampling has been previously conducted outside the harbour at a small number of locations and has demonstrated that the material is far less likely to contain contaminants than within the inner harbour.

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A review of this background information is included in the SAP proposal and the results of the SAP analyses will be incorporated into the DSDMP.

Suitable analyses will be conducted on sufficient sediment samples to allow provision for either sea based or land based disposal. Disposal of dredge material to land is an option being evaluated during engineering design.

If land disposal is selected as a viable approach, the PER/EIS will include details of studies to:

- Characterise the presence of any contaminants within the dredged sediment to confirm its suitability for disposal to land and end land use;
- Characterise the nature of any discharge water from the disposal area;
- Determine appropriate management measures for the dredged material and any discharge to the environment;
- Predict the potential impacts of any required discharge and any associated turbidity plumes;
- Detail a monitoring program of any discharges to the environment;
- Manage the proposed end land use of the disposal area; and
- Characterise baseline sediment and water quality in the receiving environment.

8.5.4 Marine Fauna

Dredging activities, pile driving, blasting (if required), infrastructure development, shipping movements and noise have the potential to interfere with the normal behaviour of migratory and resident marine mammals and turtles.

There is a minor risk that marine wildlife such as humpback whales, turtles and dugongs may be vulnerable to disturbance from increased boating activity, turbidity plumes and underwater noise caused by the dredging program. Investigations undertaken to establish the potential impact on marine fauna will include:

- A review of available information on protected species abundance and habitat relating to the relative distribution and migration pathways (including discussions with DEC on the significance of mainland turtle nesting beaches);
- Assessment of data limitations on listed species or habitats in areas of potential impact;
- A risk assessment for individual protected species including whales, turtles and dugongs;
- Compilation of background data to assist development of future monitoring programs if required; and
- Compilation of background data to assist development of management programs to reduce the risk of adverse impacts on marine turtles and other at risk fauna.

Recognised marine turtle and marine mammal consultants will be engaged to conduct thorough investigations relating to all species potentially encountered in the region; and will examine the location, extent and susceptibility to impact of all identified habitat (e.g. feeding and breeding grounds, migratory pathways and timing). These studies will be linked to other investigations (e.g. marine noise investigations, light investigations) (Section 8.5.5 and 8.6).

Management procedures will be developed to minimise or eliminate potential impacts to turtles or mammals. The management procedures will include provision for monitoring to assess potential impacts on any species identified to be potentially at risk, and actions to offset any observed impacts. Potential management measures may include:

- The relocation of dredging activities if marine turtles or mammals are observed in the vicinity;
- Minimisation, modification or temporary cessation of noise intensive activities (e.g. piling and blasting) if marine mammals are spotted within close proximity; and

- Design of lighting so as to minimise potential disorientation of turtles, or susceptibility to predators as a result of increased silhouetting.

8.5.5 Marine Noise and Vibration

Noise and vibration emissions in the marine environment will be generated by construction activities including piling, dredging and blasting (if necessary).

Proposed piling and blasting (if required) will be short term activities during the construction phase, however dredging activities will occur over an extended period of approximately 2 years. Periodic dredging thereafter will be required to maintain the shipping channel depth.

Limited noise data is available for noise emissions from dredges. Based on previous dredging programs conducted within Port Hedland, it is anticipated that noise from the dredge(s) will not be a major contributor to noise levels within the Town of Port Hedland. Most of the dredging will take place sufficiently distant from populated areas such that the works will not add to the existing noise levels experienced by residents of the Town of Port Hedland.

The amount of noise generated from the dredge will be largely dependent on dredging methodology, which will be governed by seabed substrate characteristics.

A recognised marine noise consultant will be engaged to undertake desktop studies and to collect field data of current marine noise propagation in the vicinity of the proposed development and existing shipping channel. Marine noise data will be collected in the field for a minimum period of two weeks to ensure coverage of shipping activities across a full tidal cycle.

The field data will be used to model existing marine noise offshore of Port Hedland and the potential noise levels generated as a result of the proposed development. Together, the marine noise and marine mammal consultants will determine the marine species and communities (including migratory and/or threatened species) at risk from noise impacts that are known to inhabit or migrate through the area and their tolerance thresholds. Specifically, they will determine the likelihood of these species being in the vicinity of the proposed development, the time of year and residence time in the area, the existing and proposed noise levels, the potential impacts on identified species (marine mammals and reptiles) and a management plan to mitigate/eliminate the potential impacts.

Potential management measures and predicted effectiveness that will be considered to minimise impacts on mammals/turtles include:

- Suspension or modification of blasting activities when marine mammals or turtles are observed; and
- Suspension or modification of piling activities when marine mammals or turtles are observed.

8.6 LIGHT EMISSIONS

A light assessment will be conducted on the significance of potential impacts arising from light spill on visual amenity and various fauna. Investigations will be carried out in accordance with the Draft Guidance Statement No.33 Environmental Guidance for Planning and Development. The scope of the assessment will include:

- Identify sources, type of light and existing levels of light for proposed infrastructure;
- Assess light emissions likely to have resulted from the Boodarie HBI Plant;
- Model cumulative light emissions likely to result from the Outer Harbour Development and infrastructure associated with the FMG and PHPA's Utah Point proposals and BHPBIO's RGP4, RGP5 and Nelson Point operations;
- Model the light spill and identify potential impacts of light emissions on visual amenity in areas of interest including:
 - Port Hedland;

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- Wedgefield; and
- South Hedland.
- Model the light spill and identify potential impact on turtle nesting behaviour in areas of interest including:
 - Cemetery Beach;
 - Pretty Pool; and
 - Cooke Point.
- Model the potential impacts of light spill on migratory and/or threatened species.

Potential light spill management and mitigation strategies may include:

- Ensure the design considers the use of 'best available technology' to reduce effects of lighting to 'as low as reasonably practicable'; and
- Restrict direct lighting to operating areas through the use of shields and incorporating best available designs.

8.7 ABORIGINAL HERITAGE

It is anticipated that Aboriginal heritage will be a key environmental factor for the Outer Harbour Development with sites potentially occurring within the terrestrial footprint of the study area.

Aboriginal heritage surveys inclusive of archaeological and ethnographic surveys will be conducted over the study area. Relevant Aboriginal groups and representatives will take part in such investigations. Results will be included in the assessment document and incorporated into a Cultural Heritage Management Procedure (CHMP). Detailed assessment of potential impacts and development of mitigation measures will occur under the provisions of the *Aboriginal Heritage Act 1972*.

Heritage management practices for the protection of Aboriginal sites within the Outer Harbour Development study area will be outlined in the CHMP. BHPBIO will prepare the CHMP in consultation with the Marapikurrinya Proprietary Limited (MPL). Heritage management practices outlined in the CHMP are likely to include:

- A heritage monitoring programme where ground disturbance is supervised by traditional owners;
- Fencing and signing of heritage sites where appropriate;
- Restricting the availability of heritage information;
- Cultural awareness training for BHPBIO employees and contractors;
- Mitigation and salvage work to meet any Section 18 requirements; and
- Monitoring of indirect impacts.

8.8 SOCIAL IMPACTS

Social

SIA is fundamental to the planning, development and subsequent approval of the Outer Harbour Development.

To understand the full range of impacts of the proposed development on the community, BHPBIO will continue to utilise and build on existing social impact analyses undertaken in the Port Hedland area. Specifically, as part of the SIA process, BHPBIO will:

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- Identify the social, environmental and economic impacts and opportunities associated with the Outer Harbour Development;
- Review previous and existing SIA methodologies and where practicable adopt best practice techniques;
- Source and collate relevant and current data required for the SIA process;
- Identify management mechanisms to prevent, minimise or mitigate potential impacts; and
- Identify opportunities to maximise the positive contribution of the Outer Harbour Development.

The results of the SIA and community consultation will be incorporated into the PER/EIS. Appropriate management measures will also be identified in consultation with the community and other stakeholders and will remain aligned wherever possible with community priorities.

Health

During the construction phase all appropriate measures will be taken to minimise mosquito related issues.

BHPBIO will undertake larval and adult mosquito control measures including fogging residual surface spraying as deemed necessary. If any offsite chemical control measures are to be undertaken, this will be done in consultation with the relevant authorities to prevent adverse impacts on the surrounding environment, including mangroves. In addition, the dangers of mosquitoes and appropriate protective measures will be highlighted through workforce education.

9 PROPOSED ENVIRONMENTAL MANAGEMENT FRAMEWORK

Overarching the potential environmental management measures of the Outer Harbour Development are BHPBIO's Sustainable Development Policy and HSEC Management Standards. The Policy and Standards demonstrates BHPBIO's commitment to the International Council on Mining and Metals' (ICMM) sustainable development principles, and forms the sustainability framework to which the Company operates.

This section describes this framework and the context to which potential environmental management plans and procedures will be developed and implemented for the Outer Harbour Development (refer to Table 7-2).

9.1 ENVIRONMENTAL MANAGEMENT SYSTEM

Consistent with the ISO14001 Standard, BHPBIO's Environmental Management System (EMS) comprises the following principal components that set out a process for continued improvement:

- Environmental policy and standards;
- Planning;
- Implementation and operation;
- Monitoring and corrective action; and
- Management review.

9.1.1 Corporate Sustainability Framework

The BHPBIO Corporate Sustainability Framework is illustrated in Figure 9-1 and summarised below:

- The framework is the BHPBIO's "overriding commitment to health, safety, environment, community responsibility and sustainable development". It presents BHPBIO's purpose, which is "to create value through the discovery, development and conversion of natural resources, and the provision of innovative customer and market-focused solutions". In doing so, BHPBIO's values an overriding commitment to health, safety, environmental responsibility and sustainable development;
- Supporting the framework is the Sustainable Development Policy, which outlines a commitment to sustainable development and to continual improvement in performance, efficient use of natural resources and aspires to zero harm to people and the environment;
- The framework is implemented via the HSEC Management Standards and associated guidelines; and
- The implementation of the HSEC Management Standards and associated guidelines is measured through BHPBIO Assessment and Targets Reporting processes.

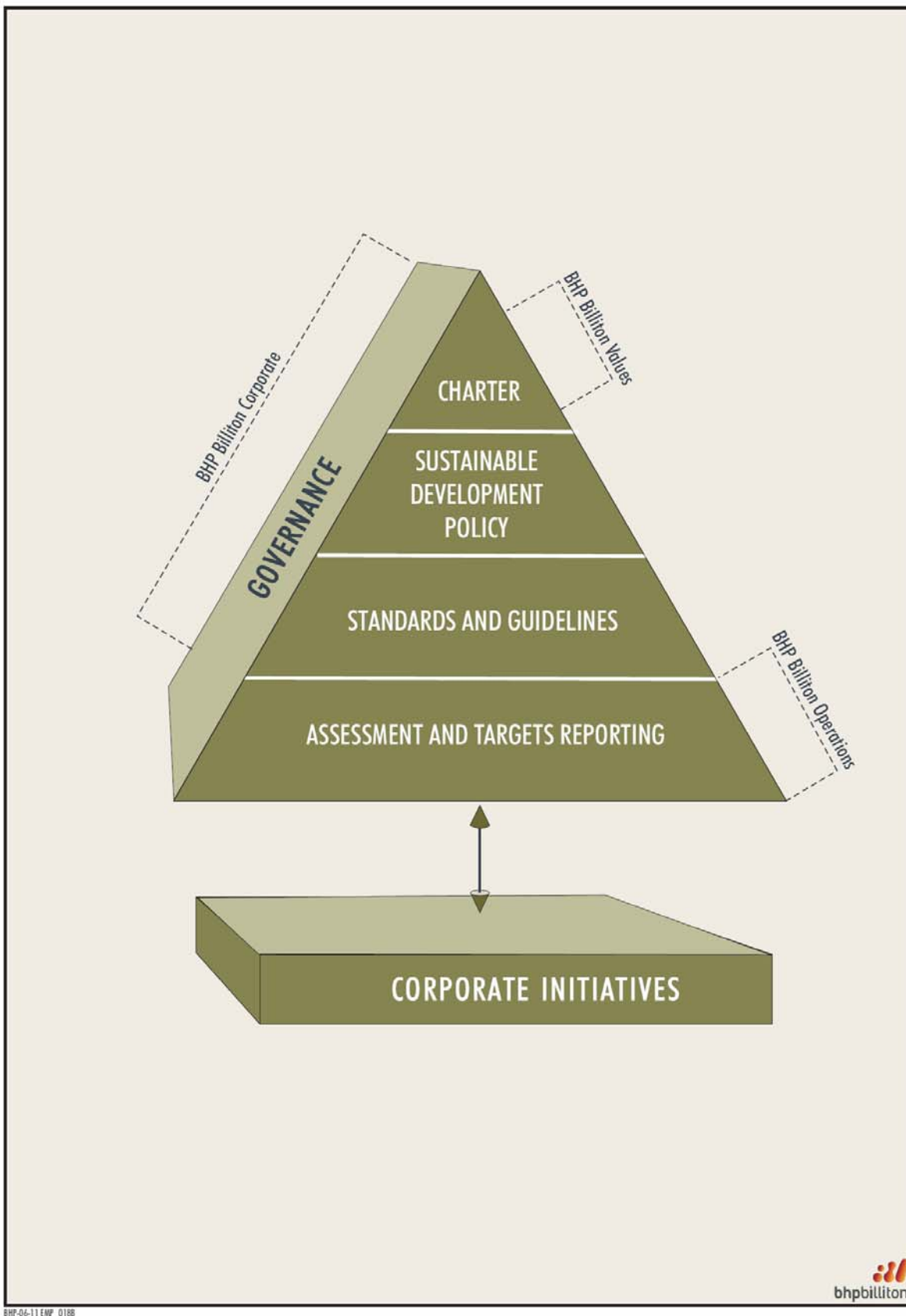


Figure 9-1 BHP Billiton Corporate Sustainability Framework

9.1.2 Environmental Policy and Standards

The principles of sustainable development are implemented across all BHPBIO's operations through the use of the BHPBIO's HSEC Management Standards. These management standards have been developed to interpret and support the Sustainable Development Policy. The standards are the basis for the development and application of HSEC Management Systems at all levels of BHPBIO's operations.

The objectives of BHPBIO's HSEC Management Standards are to:

- Provide a risk-based management system framework, consistent with the BHP Billiton Enterprise Wide Risk Management (EWRM) Policy, and with ISO 14001, OHSAS 18001, SA 8000 and other internationally recognised standards, that support the implementation of the BHPBIO Charter, and the Sustainable Development Policy across all BHPBIO operations;
- Set out and formalise expectations for the progressive development and implementation of detailed HSEC Management Systems at all levels of BHPBIO operations;
- Provide benchmarking, against which HSEC Management Systems across all BHPBIO operations can be measured; and
- Provide a basis from which to drive continuous improvement towards leading industry practice and sustainable development.

The HSEC Management Standards are described in full within the Health, Safety, Environment and Community Management Standards (BHP Billiton 2005) under the following 15 topics:

1. Leadership and Accountability;
2. Legal Requirements and Document Control;
3. Risk and Change Management;
4. Planning, Goals and Targets;
5. Awareness, Competence and Behaviour;
6. Health and Hygiene;
7. Communication, Consultation and Participation;
8. Business Conduct, Human Rights and Indigenous Affairs;
9. Design, Construction and Commissioning;
10. Operations and Maintenance;
11. Suppliers, Contractors and Partners;
12. Product Stewardship;
13. Incident Reporting and Investigation;
14. Crisis and Emergency Management; and
15. Monitoring, Audit and Review.

9.2 POTENTIAL MANAGEMENT PLANS AND PROCEDURES

With the Policy and Management Standard framework outlined above, detailed management plans and procedures are developed for each operation. For the Outer Harbour Development, the following management plans and procedures are considered necessary to manage potential environmental impacts. This is an indicative (potential) list identified through the project risk assessment process and is based upon current preliminary project design information.

As the project is further defined and the outcomes of environmental investigations become available, the list of management plans and procedures will be reviewed and revised as necessary. BHPBIO proposes to provide with the PER/EIS a series of management plans as indicated in Table 9-1. Detailed procedures that will underpin these management plans will be developed prior to construction commencing.

Table 9-1 Indicative Management Mechanisms

Indicative Management Mechanisms	Significance of Factor	Inclusion in PER/ EIS	Comment
Management Plans			
Acid Sulfate Management Plan	Medium	✓	Preliminary version will be provided. Final Plan will be developed following detailed site investigations in early to mid 2009.
Dust Management Plan	High	✓	Based upon BHPBIO's existing Dust Management Plan for current Port Hedland operations.
Noise Reduction Management Plan	High	✓	Based upon BHPBIO's existing Noise Reduction Management Plan for current Port Hedland operations.
Significant Species Management Plan (including turtles and marine mammals)	High	✓	Preliminary version will be provided. Final Plan will be developed following detailed site investigations in early 2009.
Dredging and Spoil Disposal Management Plan	High	✓	Preliminary version will be provided. Final Plan will be developed following detailed information provided from the dredge contractor.
Non-Endemic Marine Species Management Plan	Medium	✓	Appended to DSDMP.
Decommissioning, Closure and Rehabilitation Plan	Low		Developed consistent with BHPBIO's existing Port Hedland operations decommissioning and closure plan.
Potential Management Procedures			
Clearing	High		All procedures will be developed prior to construction and based upon existing BHPBIO procedures.
Topsoil Management	High		
Fire Management	High		
Spill Response	Low		

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Indicative Management Mechanisms	Significance of Factor	Inclusion in PER/ EIS	Comment
Dewatering Management	Medium		
Construction Noise Monitoring	High		
Construction Environmental Management	N/A		
Rehabilitation Management	High		
Traffic Management	High		
Hazardous Materials Management	Low		
Waste Management	Medium		
Cultural Heritage Management	High	Refer to comment.	Developed in liaison with Aboriginal heritage groups and provided to Department of Indigenous Affairs.

10 PEER REVIEW

BHPBIO recognises the value that the EPA places on the veracity of the technical work underpinning environmental assessments. Consequently, BHPBIO intends to undertake ongoing peer reviews of the environmental impact assessment process and all the environmental deliverables and outputs.

The peer review group will have input at several stages of the assessment process. As a minimum, the peer review group will assist in:

- Development and assessment of study methodologies;
- Providing advice and input in study results and conclusions;
- Reviewing and evaluating technical reports; and
- Providing general technical advice as required.

11 REFERENCES

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12 GLOSSARY OF TERMS AND ABBREVIATIONS

Abbreviation	Long Title
ABWMAC	Australian Ballast Water Management Advisory Council
ANZECC	Australia and New Zealand Environment and Conservation Council
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine and Inspection Service
ASS	Acid Sulfate Soils
BBP	Babcock and Brown Power
BHPBIO	BHP Billiton Iron Ore
BPPH	Benthic Primary Producer Habitat
CALM	Conservation and Land Management
CAMBA	China-Australia Migratory Bird Agreement
CCG	Community Consultative Group
CD	Chart Datum
CEMP	BHPBIO's Standard Operating Practices
CHMP	Cultural Heritage Management Procedure
CO ₂ -e	Carbon dioxide equivalent
CRIMP	Centre for Research on Introduced Marine Pests
CSD	Cutter Suction Dredge
DAFF	Department of Agriculture, Forestry and Fisheries
DASSI	Detailed Acid Sulfate Investigation
DEC	Department of Environment and Conservation
DEWHA	Department of the Environment, Water, Heritage and the Arts
dB	Decibels
DoF	Department of Fisheries
DoH	Department of Health
DoIR	Department of Industry and Resources
DoW	Department of Water
DPI	Department of Planning and Infrastructure
DRF	Declared Rare Flora
DSDMP	Dredging and Spoil Disposal Management Plan
DWT	Deadweight tonnes
EIS	Environmental Impact Statement
ENV	ENV. Australia
EMS	Environmental Management System
EPA	Environmental Protection Authority
EPA SU	Environmental Protection Authority Service Unit
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Conservation Act 1999</i>
EWRM	Enterprise Wide Risk Management
FMG	Fortescue Metals Group
GBRMPA	Great Barrier Reef Marine Park Authority
GIS	Geographic Information Systems
GL/a	Giga Litres per annum

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Abbreviation	Long Title
ha	Hectares
HBI	Hot Briquetted Iron
HiVol	High Volume Samplers
HSEC	BHPSIO Health, Safety, Environment and Community policy
IALA	International Association of Lighthouse Authorities
ICMM	International Council on Mining and Metals
IDF	Intensity, Duration, Frequency
IMO	International Maritime Organisation
JAMBA	Japan-Australia Migratory Bird Agreement
km	Kilometres
KPI	Key performance indicator
LIDAR	Light Detection and Ranging
LRP	Lump rescreening plant
m	Metres
Mm ³	Million cubic metres
MOF	Materials Offloading Facility
MPL	Marapikurrinya Proprietary Limited
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Mega watts
NATA	National Accredited Testing Association
NEPC	National Environmental Protection Council
nm	Nautical mile
NODGDM	National Ocean Disposal Guidelines for Dredged Material
PAM	Preassembled Modular Road
PASSI	Potential Acid Sulfate Soil Investigation
PER	Public Environmental Review
PHPA	Port Hedland Port Authority
PM ₁₀	Particulate matter less than 10 microns in diameter
PSD	Particle size distribution
SAP	Sampling and Analysis Plan
SIA	Social Impact Assessment
SRE	Short Range Endemics
t	Tonnes
TBT	Tributyltin
TEC	Threatened Ecological Community
ToPH	Town of Port Hedland
TSHD	Trailing Suction Hopper Dredge
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UDP	Ultimate Development Plan
µg/m ³	Micrograms per cubic metre
WAPC	Western Australian Planning Commission

Appendix A BHPBIO Sustainable Development Policy

OUR APPROACH TO HEALTH, SAFETY, ENVIRONMENT AND THE COMMUNITY

BHP BILLITON'S SUSTAINABLE DEVELOPMENT POLICY

At BHP Billiton our objective is to be the company of choice – creating sustainable value for our shareholders, employees, contractors, suppliers, customers, business partners and host communities.

We aspire to Zero Harm to people, our host communities and the environment and strive to achieve leading industry practice. Sound principles to govern safety, business conduct, social, environmental and economic activities are integral to the way we do business.

Wherever we operate we will develop, implement and maintain management systems for sustainable development that drive continual improvement and ensure we:

- do not compromise our safety values, and seek ways to promote and improve the health of our workforce and the community
- identify, assess and manage risks to employees, contractors, the environment and our host communities
- uphold ethical business practices and meet or, where less stringent than our standards, exceed applicable legal and other requirements
- understand, promote and uphold fundamental human rights within our sphere of influence, respecting the traditional rights of Indigenous peoples and valuing cultural heritage
- encourage a diverse workforce and provide a work environment in which everyone is treated fairly, with respect and can realise their full potential
- set and achieve targets that promote efficient use of resources and include reducing and preventing pollution
- enhance biodiversity protection by assessing and considering ecological values and land-use aspects in investment, operational and closure activities
- engage regularly, openly and honestly with people affected by our operations, and take their views and concerns into account in our decision-making
- develop partnerships that foster the sustainable development of our host communities, enhance economic benefits from our operations and contribute to poverty alleviation
- work with those involved through the lifecycles of our products and by-products to promote their responsible use and management
- regularly review our performance and publicly report our progress.

In implementing this Policy, we will engage with and support our employees, contractors, suppliers, customers, business partners and host communities in sharing responsibility for meeting our requirements.

We will be successful when we achieve our targets towards Zero Harm, are valued by our host communities, and provide lasting social, environmental and economic benefits to society.



Marius Kloppers
Chief Executive Officer

1 October 2007



bhpbilliton

Appendix B Stakeholder Register and Consultation Record

Members of the public living in Port Hedland, South Hedland and Wedgefield;
Aboriginal communities, particularly the Kariyarra group;
Commonwealth Department of the Environment, Water, Heritage and the Arts;
Environmental Protection Authority;
Department of Environment and Conservation;
Environmental Management Branch;
Marine Ecosystems Branch;
Karratha Regional offices.
Department of Water;
Commonwealth Department of Innovation, Industry, Science and Research;
Australian Maritime Safety Authority;
Department of Industry and Resources;
Department for Planning and Infrastructure;
Department of Indigenous Affairs;
Landcorp;
Town of Port Hedland;
Port Hedland Port Authority;
Pilbara Development Commission;
Main Roads Western Australia;
Fisheries WA;
Australian Fisheries Management Authority;
Local, state and national conservation groups;
Geosciences Australia;
Invest Australia;
Neighbouring onshore industries;
Tourism operators; and
Fishing operators.

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Table B-1 Consultation to Date – Issues Raised

Driver	Date	Activity	Stakeholder Organisation	Concerns Raised	Immediate Response
Introduce conversation relating to NHPBIO growth; Establish an open dialogue with key stakeholders for ongoing engagement on both specific and general growth related issues; and Provide an overview of what the company is planning to achieve in the next 5-10 years.	December 2007	Presentation at meeting.	Community Consultative Group (CCG).	<ul style="list-style-type: none"> How many people will be needed during the construction phase of the growth project? Is there any way that we could include housing as a requirement for government in the Hedland Future Today document? Is there any way that BHPBIO can convince staff to change their address on the electoral role so that Port Hedland can have accurate population statistics to better address housing needs? 	The numbers are not available at this stage. The Hedland Future Today document was developed after extensive consultation with the community to ascertain community needs. The project will now be coordinated by the Town of Port Hedland.
	January 2008	Personal conversation.	Town of Port Hedland.	<ul style="list-style-type: none"> Boat ramp; Accommodation – especially for low income earners; Mangroves and turtle impacts; Traffic movements, trains delaying traffic movements; Dust; Indigenous benefits; and Social benefits. 	Immediate action: Stakeholders advised that BHPBIO has committed to keeping an open dialogue around growth plans. Further action: Issues registered so that future dialogue will provide information about BHPBIO's plans and operations around specific issues highlighted. Growth Council formed to discuss issues as a 'whole of town' approach. Representatives from industry, local government, state government and service providers.
Informed general community.	February 2008	Article in the advertorial in the North West Telegraph (NWT). Published on 06/02/2008.	Port Hedland and Newman communities.	N/A – information only.	N/A – information only. Contact details for enquires placed at the end of advertorial.
Informed workforce and stakeholders	February 2008	Weekly Notes	Internal – all staff.	N/A – information only.	N/A – information only. Primary stakeholder, keep workforce informed

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Driver	Date	Activity	Stakeholder Organisation	Concerns Raised	Immediate Response
					of status of business growth plans.
	December 2007	Oresome Magazine Dec 07/Jan 08.	Internal – all staff. External – Port Hedland and Newman Communities.	N/A – information only. Message – BHPBIO is engaging with the community on growth opportunities.	N/A – information only. Primary stakeholder, keep workforce informed of status of business growth plans.
Informed workforce	February 2008	Oresome Magazine – Feb.	Internal – all staff. External – Port Hedland and Newman Communities.	N/A – information only. Message – BHPBIO is engaging with the community on growth opportunities.	N/A – information only. Primary stakeholder, keep workforce informed of status of business growth plans.
Informed workforce	Ongoing	Meetings and personal briefings.	Indigenous representatives.	<ul style="list-style-type: none"> • Native title; and • Dredging. 	Ongoing communication and dredging.
	January 2008	Annual briefing.	Tug boat drivers	Drivers raised questions to operations.	Ongoing communication.
State Approvals			EPA Service Unit	<i>[further information required from BHPBIO]</i>	
Commonwealth Approvals	February 2008	Presentation at meeting.	DEWHA	<ul style="list-style-type: none"> • Referral to include sufficient flexibility to accommodate potential changes in scope; • Copy of the sea dumping application be provided with the referral; and • Need to state in the referral why the scope is limited to the port development and does not include potential rail and mine expansion projects. 	
State and Commonwealth Approvals	August 2008	Project briefing, and Port Hedland Site Visit.	EPA and DEWHA	<ul style="list-style-type: none"> • PER document meets requirements for both State and Commonwealth approvals; and • Submission of Sampling and Analysis Plan for approval. 	The Environmental Scoping Document would be submitted to both EPASU and DEWHA in September 2008. BHPBIO provided copy of Sampling and Analysis Plan.
Aboriginal Heritage	February 2008	Regular project briefing of BHPBIOs growth plans.	DIA	Potential for indirect impacts on sites of heritage significance What management measures are to be taken to minimise	BHPBIO to provide further presentations following completion of relevant studies.

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Driver	Date	Activity	Stakeholder Organisation	Concerns Raised	Immediate Response
				impacts.	
Inform general community	March 2008	Regular project briefing of BHPBIOs growth plans.	Port Hedland communities, and stakeholder groups	<ul style="list-style-type: none"> • What is the Outer harbour timeline for development? • What will the length of the Outer Harbour be? 	Queries answered at the time with Concept design details.
	June 2008	Regular project briefing of BHPBIOs growth plans.	Port Hedland Game Fishing Club	<ul style="list-style-type: none"> • Concerns raised regarding jetty length and having to go around it, possibility of boat exclusion zone? • Will there be access under the jetty? 	BHPBIO is evaluating options as part of engineering design to include potential for thoroughfare through jetty structure.
BHPBIOs growth plans	July 2008	Project briefing and meeting to discuss potential impacts.	Town of Port Hedland	<ul style="list-style-type: none"> • Mosquito management; • Noise resulting from dredging; • Potential dust impacts; and • Rail line crossing-waiting periods. 	Queries answered at the time. BHPBIO to provide further presentations following completion of relevant studies.
BHPBIOs growth plans	July 2008	Project briefing and meeting to discuss potential impacts.	Care for Hedland	<ul style="list-style-type: none"> • Impacts to mangroves and potential impacts such as erosion. 	BHPBIO to provide further presentations following completion of relevant studies.
BHPBIOs growth plans	July 2008	Project briefing and meeting to discuss potential impacts.	PHPA	<ul style="list-style-type: none"> • Disturbance to recreational diving in area due to dredge spoil disposal; • Covering of conveyors and transfer points; and • Long term plans for public access to Flinucane Island. 	BHPBIO are evaluating options as part of engineering design.

Appendix C State and Commonwealth Legislation – Protected Species and Areas

The Wildlife Conservation (Specially Protected Fauna) Notice 2006(2) lists fauna that is rare, likely to become extinct and other 'specially' protected species in Western Australia. Marine reptiles, mammals and birds listed in this notice could potentially be observed in the study area. Cetaceans, such as the blue whale, which are found in deepwater (> 20 m), and albatrosses, which are typically found well-offshore, are excluded from this list. Table C-1 also outlines species specifically protected by Commonwealth legislation that will be addressed as part of the EPBC referral process.

Table C-1 Fauna listed as Rare or Specially Protected under the WA Wildlife Conservation (Specially Protected Fauna) Notice 2006(2) and the EPBC Act 1999

Fauna that is Rare (Potentially occurring)	State Listed	Commonwealth Listed and Status	Specific reference to the Port Hedland Area
Birds			
<i>Haliaeetus albicilla albicilla</i> White-tailed Sea Eagle	✓		
<i>Charadrius veredus</i> Oriental Plover, Oriental Dotterel		Migratory	Species or species habitat may occur within area
<i>Haliaeetus leucogaster</i> White-bellied Sea-eagle		Migratory	
<i>Glareola maldivarum</i> Oriental Pratincole		Migratory	
<i>Macronectes giganteus</i> Southern Giant-Petrel		Endangered	
<i>Merops ornatus</i> Rainbow Bee-eater		Migratory	
<i>Numenius minutus</i> Little Curlew, Little Whimbrel		Migratory	
<i>Anous tenuirostris melanops</i> Lesser Noddy	✓		
<i>Sula dactylatra bedouti</i> Masked Booby	✓		
Mammals			
<i>Balaenoptera edeni</i> Bryde's Whale		Migratory	Species or species habitat may occur within area
<i>Dugong dugon</i> Dugong	✓	Migratory	Species or species habitat likely to occur within area
<i>Megaptera novaeangliae</i> Humpback Whale	✓	Vulnerable	Migrates offshore, in waters approx. 30 m deep, from June to October. Species or species habitat known to occur within area
<i>Orcinus orca</i> Killer Whale, Orca		Migratory	Species or species habitat may occur within area
<i>Sousa chinensis</i> Indo-Pacific Humpback Dolphin		Migratory	Species or species habitat may occur within area
<i>Tursiops aduncus</i> (Arafura/Timor		Migratory	Species or species

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Fauna that is Rare (Potentially occurring)	State Listed	Commonwealth Listed and Status	Specific reference to the Port Hedland Area
Sea populations) Spotted Bottlenose Dolphin			habitat likely to occur within area
Reptiles			
<i>Caretta caretta</i> Loggerhead Turtle	✓	Endangered	Species or species habitat may occur within area
<i>Chelonia mydas</i> Green Turtle	✓	Vulnerable	Common in nearshore waters
<i>Dermochelys coriacea</i> Leathery Turtle, Leatherback Turtle	✓	Vulnerable	Species or species habitat may occur within area
<i>Eretmochelys imbricata</i> Hawksbill Turtle	✓	Vulnerable	Species or species habitat may occur within area
<i>Natator depressus</i> Flatback Turtle	✓	Vulnerable	Nesting areas: Munda Beach and Cemetery Beach
<i>Lepidochelys olivacea</i> Olive Ridley Turtle	✓		
Sharks			
<i>Rhincodon typus</i> Whale Shark		Vulnerable	Species or species habitat may occur within area
<i>Carcharias aurus</i> Grey Nurse Shark	✓		
<i>Carcharodon carcharias</i> Great White Shark	✓		
Other			
<i>Pristis zijsron</i> Green Sawfish	✓		

State and Commonwealth Marine Protected Areas

There are no existing or proposed State or Commonwealth marine protected areas (MPA) in the study area. The closest existing marine parks are the Montebello Marine Conservation Reserve located west of Dampier (approximately 300 km from the existing Port Hedland shipping channel) and the Rowley Shoals Marine Park located north of Port Hedland (approximately 265 km from the existing Port Hedland shipping channel). The proposed Dampier Archipelago Marine Park is situated in the Dampier region, 225 km west of Port Hedland.

The closest Commonwealth Marine Parks include Ningaloo Marine Park (Commonwealth Waters) west of Exmouth and the Mermaid Reef Marine National Nature Reserve, north of the Rowley Shoals Marine Park.

World Heritage locations and Ramsar Wetlands

There are no World Heritage locations in the study area. The closest is the Shark Bay World Heritage Property.

Similarly there are no Ramsar wetlands in the study area. The closest is Eighty Mile Beach approximately 250km to the east of Port Hedland.

Appendix D Compliance to DEWHA EIS Guidelines

DEWHA Guidelines	Referenced in ESD	Comment
<p>1 General Information</p> <p>This should provide the background and context of the action including:</p> <ul style="list-style-type: none"> a) The title of the action; b) The full name and postal address of the designated Proponent; c) A clear outline of the objective of the action; d) Legislative background for the proposal, including the NES matters protected under Part 3 of the EPBC Act and any other requirements and approvals needed under the EPBC Act; e) The location of the action; f) The background to the development of the action; g) How the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action; h) The current status of the action; and i) The consequences of not proceeding with the action. 	<p>Section 2.1</p> <p>Section 2.3</p> <p>Section 4.1</p> <p>Section 3.1</p> <p>Section 2.1</p> <p>Section 2.1</p> <p>Section 2.6 and 5.2</p> <p>Section 3.3</p> <p>Section 2.4</p>	<p>Also refer to Figure 2-1 & Figure 2-2</p>
<p>2 Description of the Action</p> <p>All construction components of the action, should be described in detail. This should include the precise location of all works to be undertaken, structures to be built or elements of the action that may have impacts on matters of national environmental significance.</p> <p>The above information must include details on how the works are to be undertaken (including stages of development and their timing) and design parameters for these aspects of the structures or elements of the action that may have relevant impacts.</p>	<p>Section 4</p>	

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DEWHA Guidelines	Referenced in ESD	Comment
<p>3 Feasible Alternatives</p> <p>Any feasible alternative to the action to the extent reasonably practicable, including;</p> <ul style="list-style-type: none"> a) If relevant, the alternative of taking no action; b) A comparative description of the impacts of each alternative on the NES matter protected by Part 3 of the EPBC Act; and c) Sufficient detail to make clear why any alternative is preferred to another. <p>Short, medium and long-term advantages and disadvantages of the options should be discussed.</p>	<p>Not relevant</p> <p>Section 2.5</p> <p>Section 2.5</p> <p>Section 2.5</p>	<p>Both the Conceptual Phase Study and BPHBIO's Project Evaluation Process incorporated priority terrestrial flora and fauna into the selection of preferred alternative. Further detailed information on alternatives considered and the evaluation process will be provided in the PER/EIS.</p>

DEWHA Guidelines	Referenced in ESD	Comment
<p>5 Relevant Impacts</p> <p>a) The EIS must include a description of all the potential relevant impacts if the action of the ecology, hydrology, and geomorphology of the project are as it relates to the NES matters protected under Part 3 of the EPBC Act, including but not restricted to;</p> <ul style="list-style-type: none"> • A detailed assessment, developed in consultation with appropriate recognised experts, of the nature and extent of the likely short-term, long-term and consequential relevant impacts. • The Commonwealth marine environment such as: <ul style="list-style-type: none"> i. The potential direct, indirect and consequential impacts on regional habitat and the Commonwealth marine environment; ii. Impacts on other users of the area; iii. The potential impacts on important amenities, navigation, culturally and historically significant sites, threatened or migratory species or sensitive habitats; iv. Potential impacts on listed marine species; v. The potential risk of pest species becoming established in the Commonwealth marine area; vi. Changes in air and water quality. • A statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; • Analysis of the significance of the relevant impacts; and • Any technical data and other information used or needed to make a detailed assessment of the relevant impacts. 	<p>Table 7-2, Section 8.0</p>	<p>The preliminary impact assessment has highlighted the potential impacts associated with the development. A final impacts assessment will be conducted when the proposed investigations and studies have been completed.</p>

DEWHA Guidelines	Referenced in ESD	Comment
<p>9 Information Sources Provided in the EIS</p> <p>For information given in a draft Environmental Impact Statement, the draft must state:</p> <ul style="list-style-type: none"> a) The source of the information; b) How recent the information is; c) How the reliability of the information was tested; and d) What uncertainties (if any) are in the information. 	<p>Section 11</p> <p>Section 11</p>	<p>All information obtained will be referenced accordingly.</p> <p>Any limitations/validation issues identified in the information used will be highlighted in the Limitations section in the PER/EIS.</p> <p>Any limitations in studies and investigations will be documented accordingly.</p>
<p>10 Environmental Record of Peron(s) Proposing to Take the Action</p> <p>Details of any proceeding under a Commonwealth, State or Territory law for the protection of the environment of the conservation and sustainable use of the natural resources against:</p> <ul style="list-style-type: none"> a) The person proposing to take the action; and b) For an action for which a person has applied for a permit, the person making the application. <p>If the person proposing to take the action is a corporation, also include details of the corporation's environmental policy and planning framework.</p>	<p>Section 9</p> <p>Appendix A</p>	
<p>11 Conclusion</p> <p>An overall conclusion as to the environmental acceptability of the proposal should be provided, including discussion on compliance with principles of ESD and the objects and requirements of the EPBC Act. Reason justifying undertaking the proposal in the manner proposed should also be outlined.</p> <p>Measures proposed or required by way of offset for any unavoidable impacts on NES matters, and the relative degree of compensation, should be highlighted.</p>		<p>PER/EIS to include a conclusion highlighting environmental acceptability, including relevant discussions.</p> <p>PER/EIS to include any offset measures identified.</p>

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Appendix E Risk Assessment
Table E-1 Severity Factor Assessment Matrices

Severity Level						Severity Factor
	Health and safety	Natural environment	Social/cultural heritage	Community/ Govt/Reputation/ Media	Legal	
7	> 500 fatalities or very serious irreversible injury to > 5000 person.	Very significant impact on highly valued species, habitat or eco system.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Prolonged international condemnation.	Potential jail terms for executives and/or very high fines for company. Prolonged, multiple litigation.	1000
6	>50 fatalities, or very serious irreversible injury >500 persons.	Significant impact on highly valued species, habitat, or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	International multi-NGO and medial condemnation.	Very significant fines and prosecutions. Multiple litigation.	300
5	Multiple fatalities, or very significant irreversible effects to <50 persons.	Very serious, long-term environmental impairments of ecosystem function.	Very serious widespread social impacts. Irreparable damage to highly valued items.	Serious public or media outcry (international coverage).	Significant prosecution and fines. Very serious litigation, including class actions.	100
4	Single fatality and/or sever irreversible disability (>30%) to one or more persons.	Serious medium term environmental effects.	On-going serious social issues. Significant damage to structures/items of cultural significance.	Significant adverse national media/public/NGO attention.	Major breach of regulation. Major litigation.	30
3	Moderate irreversible disability or impairment (<30%) to one or more persons.	Moderate, short-term effects but not affecting eco system function.	On-going social issues. Permanent damage to items of cultural significance.	Attention from media and/or heightened concern by local community. Criticism by NGOs.	Serious breach of regulation with investigation or report to authority with prosecution and/or moderate fine possible.	10
2	Objective but reversible disability requiring hospitalisation.	Minor effects on biological or physical environment.	Minor medium-term social impacts on local population. Mostly repairable.	Minor, adverse local public or media attention and complaints.	Minor legal issues, non-compliances and breaches of regulation.	3
1	No medical treatment required.	Limited damage to minimal area of low significance.	Low-level repairable damage to commonplace structures.	Public concern restricted to local complaints.	Low-level legal issue.	1

Table E-2 Likelihood Factor Assessment

Study and Project Delivery likelihood Factors	
based on Company and Industry experience with similar studies or projects, the event:	Likelihood Factor
Could be expected to occur more than once during the study or project delivery	10
Could be easily be incurred and has generally occurred in similar studies or projects	3
Incurred in a minority of similar studies or projects	1
Known to happen, but only rarely	0.3
Hasn't occurred in similar studies or projects, but could	0.1
Conceivable, but only in extreme circumstances	0.03

Appendix F Scope of Works for Factors of Medium Importance

This Environmental Scoping Document provides focus to environmental factors considered of high importance. The PER/ EIS will provide sufficient detail on factors of high importance to demonstrate that potential impacts can be managed or mitigated to the EPA's satisfaction.

The focus on factors of high importance does not remove the need to sufficiently address other environmental factors of lesser importance. There are several factors that fit within this category, and for reference a summary of the proposed scope of work is provided below.

F 1 Geology, Soils and Landforms

Engineering geotechnical studies will be undertaken as part of detailed engineering design early in 2009. These studies will identify the geotechnical characteristics of the study area, material types and volumes that will need to be excavated and managed during construction.

Together with these geotechnical studies detailed acid sulfate soil investigations will be conducted. The assessment of ASS will be undertaken in a two phased approach, firstly commencing with a Preliminary ASS Investigation (PASSI) followed by a Detailed ASS Investigation (DASSI). For each phased approach a Management Plan will be developed as continually updated as additional information is available from investigative studies. The scope of the PASSI and DASSI is summarised below:

F1.1 Preliminary ASS Investigations

The following tasks will be undertaken as part of the PASSI:

- Undertake a desktop review of existing ASS information that is readily available which may include BHPBIO records and reports, DEC Reports (including inspection reports) and Acid Sulfate Soils Risk Mapping;
- Undertake a detailed site walkover across all project areas where ground disturbance is planned (inclusive of stockyards, rail, conveyor corridors);
- Inspect all proposed development areas to identify existing natural ground conditions that may contribute a net risk (or opportunity) to the proposed development;
- Inspect ground conditions to assess the viability of particular ground or groundwater investigation methods to be used during necessary detailed site investigation phases; and
- Broadly characterise and describe the landforms that are affected by the proposed development.

F1.2 Preliminary ASS Management Plan

A preliminary ASS management plan (inclusive of groundwater management) will be prepared and will focus on zones identified by the PASSI as having risk of ASS disturbance and worst case scenarios. The Plan will include:

- A description of the environment of the three zones in relation to ASS occurrence and (shallow) hydrogeology;
- An assessment of engineering requirements of the operations in terms of the environmental requirements relating to the management of ASS and groundwater;
- Definition of construction operations and scheduling that will occur, including quantifying the volume of ASS that will be disturbed, and defining requirements for neutralisation and/or disposal;
- Definition of a comprehensive groundwater monitoring plan in terms of water level and quality changes during construction and a dewatering discharge water quality monitoring programme; and

- Consideration of the future land use.

The management plan will be revised following detailed ASS investigations early in 2009 (as described below).

F 1.3 Detailed ASS Investigation

The DASSI will provide particular focus on identifying potential impacts and management measure required for areas in which excavations are planned. Specifically, these include:

- The Conveyor System from the Boodarie Stockyards to Finucane Island: Designated as `High risk` of ASS occurring where excavations are planned to a 1m depth;
- The operational area at Finucane Island: Designated as at `High risk` of ASS occurring. Excavations are planned to a 1 m depth for the proposed transfer pad; and
- Boodarie Stockyards: Designated as `No known risk` of ASS occurring. Excavations are planned to a 2-3 m depth within the stockyards, 25 m depth for car dumpers and 1 to 25 m depth for conveyor tunnels.

The objectives of the DASSI will be:

- To confirm the absence or presence of ASS materials and where present to define the extent and nature;
- To confirm the existing ground conditions as they relate to the likely interaction of the project operations on the existing environment;
- To provide background data on which to base any future monitoring (including ground water monitoring) of the environment as part of operations; and
- To provide a detailed ASS and groundwater management plan for areas in which ASS may be encountered.

In order to achieve the above DASSI objectives the following tasks will be undertaken (with reference to DEC Guidelines) for targeted areas:

- To provide a detailed ASS and groundwater management plan for areas in which ASS may be encountered;
- Preparation of a sampling and analysis programme (SAP proposal) identifying logistical constraints in sampling intertidal areas. The SAP proposal will be prepared in liaison with relevant stakeholders including the DEC;
- Implement the approved SAP proposal; and
- Analyse the data and collate findings. Utilise the information to optimise engineering design, management of material and revision of the Preliminary ASS Management Plan.

F 2 Subterranean Fauna

Proposals incorporating activities that result in the lowering of the water table (groundwater abstraction), pollution of groundwater or disturbance or damage to underground caverns are identified by the EPA Guidance Statement No. 54 as those that may potentially have a significant impact on subterranean fauna and require formal assessment under the Environmental Protection Act 1986. The EPA does not require proposals that do not impact groundwater quality or subterranean cave or void systems to undertake sampling for subterranean fauna. A subterranean fauna risk assessment was developed to investigate the potential occurrence of subterranean fauna within the study area and potential risks of subterranean fauna being impacted by proposed activities. Proposed activities considered relevant to subterranean fauna included soil excavation and dewatering during construction.

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The scope of the subterranean fauna risk assessment includes:

- Collation and review of existing stygofauna and troglofauna information, including known records within or near the project area, habitat requirements and possible impacts;
- Collation and review of existing geological and hydrological information and relevant geotechnical or hydrogeological investigations within the study area;
- Identification of potential occurrence of stygofauna or troglofauna communities within the study area based on known records and suitable habitat being present;
- Provide species list of potentially occurring stygofauna or troglofauna species based on known records or suitable habitat present and highlight those of conservation significance (providing local and regional contexts, State and Commonwealth significance);
- Assessment of potential habitat destruction / alteration / fragmentation impacts or direct impacts to potentially occurring stygofauna or troglofauna resulting from planned project activities; and
- Develop recommendations for management of potentially occurring stygofauna or troglofauna and identify the need for a field sampling programme.

A subterranean fauna risk assessment has been completed by Bennelongia Consultants. This assessment concluded that:

- Troglofauna were unlikely to occur within the study area, although stygofauna may occur;
- The project was very unlikely to cause significant threat to subterranean fauna owing to the small scale at which dewatering was proposed; and
- No field sampling is required to further investigate subterranean fauna given the above conclusions.

Potential management and mitigation measures that will be considered to conserve subterranean fauna of conservation significance include:

- Avoid dewatering in areas which will negatively affect subterranean fauna; and
- Implement measures to reduce the risk of groundwater contamination.

F 3 Surface Water Flows and Water Quality

The project will include infrastructure that has the potential to impact on existing surface hydrology. Of key concern is the proposed rail spur as it will traverse across a significant distance across an area where surface water across the landscape is predominantly sheet flow. To identify and manage the potential impacts on surface water flows the following will be undertaken and summarised in the PER/EIS:

- Identify watercourses and catchments within the study area;
- Identify stormwater flows, erosion and drainage lines and potential impacts resulting from the proposed project infrastructure;
- Develop a hydrological flood model to determine existing and proposed changes to flood regimes, inclusive of cumulative effects from existing infrastructure such as the FMG rail line under construction;
- Consider climate change effects on flood regimes;
- Identify significant issues or constraints for consideration in the project design/layout; and
- Identify of management measures to minimise potential environmental impacts.

Potential management strategies that will be considered during the design phase to minimise impacts include:

- Provision of stormwater ponds and opportunities to harvest and reuse stormwater;
- Installation of culverts in designated areas to maintain surface water flows across the landscape;
- Erosion control, such as rock armouring around discharge outlets, culverts and creek crossings; and
- Flood diversion bunds to re-direct flood waters.

F 4 Groundwater Quality

A desktop hydrogeology and groundwater quality study will be conducted to determine the existing conditions within the study area. The study will be limited to collecting existing information of ground water characteristics and will compile the following information for inclusion in the PER/EIS:

- A description of existing hydrogeological formations and the nature of any groundwater aquifers in the project area;
- A prediction of post construction (site preparation), ground water flow patterns to determine potential pollutant pathways from high risk areas (if any);
- Identification of significant issues for consideration in the project design/layout;
- Identifying key management strategies, if required.

As small scale dewatering is proposed for deep excavations a dewatering management procedure will be prepared prior to any dewatering taking place. This procedure will outline key objectives, activities for managing the retention and/ or discharge of dewatering water in a manner that minimises impacts on the receiving environment.

F 5 Intertidal and Subtidal Benthic Primary Producing Habitat

The EPA Guidance Statement No. 29 (Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment) defines Benthic Primary Producer Habitat as areas that can and do support BPPs such as mangroves, samphire flats, algal mats, scleractinian corals and seagrass/macroalgae.

Based on literature searches and early field works, the BPPs and associated habitat considered of most significance and most susceptible to impact in this project are mangroves and corals.

F 5.1 Mangroves

The design of project infrastructure will consider options to avoid where possible and then minimise direct and indirect loss of mangroves. Land based surveys of intertidal BPPH will be conducted to:

- Assess the species composition and coverage of mangrove communities;
- Describe and map intertidal habitat in the areas which will be disturbed;
- Confirm the predicted loss of mangroves associated with the project and estimate cumulative losses;
- Provide background data, including the importance of these mangroves in terms of maintenance of ecosystem integrity; and
- Identify potential direct and indirect impacts from construction and operational activities.

From the current design concept, the estimated direct loss of closed canopy mangroves is approximately 8 ha with an additional loss of approximately 9 ha of sparsely populated *Avicennia Marina*. Impacts on mangroves were considered during the evaluation of infrastructure corridor alignments for the project. Ongoing efforts will be made throughout the design process to further minimise impacts to mangroves and maintain flows to the area.

The impacts to mangroves will be considered in the context of the EPA Guidance Statement No. 29. Based on previous Port Hedland port assessments by the EPA, it is anticipated that the defined management unit that may be applied to this project is 'Category E – Development Areas'.

In relation to samphire dominated habitat (no mangroves present) the estimated area of direct loss is approximately 20 ha based on the current design concept. The nature of samphire dominated habitat and the extent to which it is covered under the EPA Guidance Statement No. 29 will be discussed in consultation with the EPA and DEC.

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A detailed Mangrove Management Plan will be developed to minimise potential impacts on mangrove habitat. Potential measures may include:

- Clear physical and geographical delineation of areas to be directly disturbed;
- Monitoring and inspection of site works to ensure no clearing or disturbance outside the construction footprint;
- Measures to reduce dust emissions;
- Water quality monitoring and management; and
- Procedures for monitoring and documenting mangrove condition/health.

F 5.2 Scleractinian Coral, Seagrasses and Macroalgae

Baseline surveys have been undertaken to determine the occurrence of corals elsewhere within the study area and quantitative benthic habitat modelling will be completed to delineate BPPH throughout the predicted zone of influence of the proposal. Surveys have been based on Light Detection and Ranging (LIDAR) bathymetry maps covering an area of 3,775 km². Through analysis of LIDAR bathymetry maps, subtidal BPPH investigations have and will involve targeted surveys utilising the following field techniques:

- Towed video surveys;
- Spot observations by divers; and
- Video transects by divers.

Field data will be utilised to map habitats occurring in the study area. Habitat data will be modelled to determine spatial extent of benthic habitat types. This is aided by LIDAR bathymetry data (including slope, and aspect) and site verification from targeted field surveys. This approach has been successfully applied in recent years to mapping large study areas such as marine parks in Victoria and the Marine Futures programme in Western Australia.

The most widespread and abundant habitat in the study area identified to date is unconsolidated sediment on flat seabed. Coral is not abundant for most of the mainland coast near Finucane Island, however, coral assemblages have been identified amongst the ridge lines offshore from Finucane Island and areas around Weerde, Downes and the Turtle Islands.

The region of Port Hedland is a macro-tidal influenced environment which results in suspension of particulate matter in the water column. This has the potential to reduce light penetration to subtidal BPPH to below minimum requirements for certain functional groups (e.g. hard corals).

Field investigations to date have identified hard (scleractinian) corals as being the BPPH that is both the most widely distributed near the proposed development and the most susceptible to light reduction. The Scleractinian coral predominantly grows on a series of limestone ridges that run parallel to the coastline, at a minimum of approximately 10 km from the shore (although coral is observed closer to shore, e.g. Weerde Island). Field investigations have also observed the lack of seagrass and macroalgae in the areas offshore of Port Hedland, other than at isolated pockets, e.g. Weerde Island and the Turtle Islands. These observations have been made both in summer and winter months.

Impacts on seagrasses/macroalgae are anticipated to be minor and manageable given that these habitats are not abundant in the Port Hedland area and the foot-print impacts (i.e. zone of sedimentation either side of the dredge channel and turning basins) will primarily be restricted to unconsolidated and non-vegetated seafloor sediment.

Suitable management designs to minimise or eliminate potential impacts on subtidal BPPH will be discussed in the PER/EIS and described in detail in the Dredge Spoil Disposal and Management Plan.

F 5.3 Marine Habitat other than BPPH

Based on desktop and field studies undertaken to date, the seabed offshore of Port Hedland is predominantly comprised of medium to coarse grain sand flats supporting a mixture of soft corals, sponges, echinoderms and other invertebrates. This is the dominant seabed type between the limestone ridges that support hard coral habitats.

Given the widespread nature of the sand flat habitat, the lack of regionally significant species associated with or dependent on this habitat, and its natural dynamism (movement of sediment resulting from oceanographic and climatic variations), a preliminary assessment suggest that the proposed project will not have a major impact on biota associated with this habitat.

The primary impact to this habitat will be the dredge channel and turning basin as well as new spoil grounds. The dredged areas will not recover as periodic maintenance dredging will remove accumulated sediment and propeller movement from vessels will resuspend seafloor sediment.

The spoil grounds may have periodic recovery of in faunal communities, but this will be short lived due to deposition of material for maintenance dredging. However, areas indirectly impacted by spoil disposal should recover or recolonise over a period of months to years depending on the severity of the smothering.

Whilst these regions do not support sensitive BPPH, they will be considered in the DSDMP along with hard coral, seagrass and macroalgal habitats.

F 6 Non-endemic Marine Species

Non-endemic marine species may be introduced from foreign vessels being utilised during both construction and operation. A desktop study will be undertaken to firstly identify the potential impacts and risk of non-endemic marine species being introduced. This potential impact is minimised by implementing a detailed Environmental Management Plan.

A Non-endemic Marine Species Management Plan will be developed prior to construction and form part of the DSDMP. This plan will incorporate the draft Intergovernmental Agreement (IGA) on a National System for the Prevention and Management of Marine Pest Incursions and will also consider guidance and legislation provided from the Commonwealth Department of Agriculture, Forestry and Fisheries (DAFF) and the West Australian Department of Fisheries (DoF).

F 7 Hydrodynamics and Coastal Processes

Changes to seabed bathymetry and installation of permanent infrastructure have the potential to change hydrodynamics and coastal processes. To investigate the potential for changes to occur, the following activities will be undertaken:

- Collate existing and site specific metocean data for the study area, inclusive of currents, tides, waves (periods and direction) and wind (gust velocity and direction);
- Undertake bathymetric survey of the study area;
- Undertake a wave climate study to investigate the:
 - Ambient wave climate;
 - Extreme (cyclonic) wave climate; and
 - Long period wave climate.
- Establish a geomorphic model to identify potential areas of erosion or accretion along the coastline over a period of between 1 to 50 years; and
- Provide an assessment of potential changes to the shoreline in response to cyclonic conditions.

The results of the hydrodynamic and coastal process investigations will be reviewed and taken into consideration during the design of maritime infrastructure as part of optimising the proposed footprint.

F 8 Greenhouse Gas Emissions

Greenhouse emissions are becoming an increasingly important environmental issue. It has been estimated that the Outer Harbour Development is likely to produce over 100,000 tpa CO₂ equivalent. An assessment of proposed greenhouse emissions will be undertaken in accordance with EPA's Draft Guidance Statement No.33 Environmental Guidance for Planning and Development and Guidance Statement No. 12 Guidance for the Assessment of Environmental Factors – Guidance Statement for Minimising Greenhouse Gas Emissions.

Greenhouse gas emissions will be calculated in a manner consistent with the National Greenhouse Gas Inventory Committee Guidelines using the Australian Greenhouse Office methodology. The requirements of the Greenhouse Challenge Program will also be taken into account.

The scope of the proposed greenhouse gas emissions assessment includes:

- Identification of key emission sources (i.e. excluding embodied emissions such as wastes, consumables etc.) and emission rates during construction;
- Identification of key emission sources and rates during operation;
- Estimation of annual greenhouse emissions for the Project;
- Comparison of key emissions against 2006 levels and evaluation against relevant State and Commonwealth policies;
- Identification of management strategies to be adopted (e.g. selection and design of energy-efficient plant and equipment) to minimise emissions; and
- Review of opportunities for continuous improvement of technological and operational practices to reduce greenhouse gas emissions during operations.

F 9 Solid and Liquid Waste Disposal

A desktop study will be conducted to address solid wastes, liquid wastes (including sewage and other liquid effluents) and hazardous waste streams throughout the project life cycle (terrestrial construction activities, commissioning, operation, decommissioning and closure). The scope of the desktop study will be to:

- Determine the main solid and liquid waste stream types produced as a result of all phases of the project. Highlight key sources and quantities likely to be generated;
- Identify potential sources of hazardous wastes, quantity and likely generating activities for all phases of the project;
- Identify prevention, reduction and recycling opportunities for each type of waste;
- Identify disposal options and any special handling, storage or containment requirements for each type of waste;
- Provide a high level of assessment of the hazards related to waste management such as health and safety considerations (including fire hazards) and housekeeping requirements;
- Assess potential environmental impacts of poor waste management, including amenity, aesthetics and odour issues; and
- Make recommendations regarding management of environmental impacts associated with waste management that have been identified.

F 10 Fisheries

A desktop study will be undertaken to identify existing fisheries in the Port Hedland area. This study will be conducted concurrently with the SIA process. The scope of the study will:

- Identify commercial and recreational fisheries in liaison with stakeholders and community members;
- Assess the potential impact on fisheries by proposed construction and operating activities relating to increased turbidity in water, increased vessel movement, restricted access by local business and local community; and
- Identify proposed management strategies to minimise impacts on existing fisheries which may include reviewing construction schedules and provision of access to fishing areas.

F 11 Visual Amenity

The establishment of the proposed infrastructure is anticipated to impact on the public visual amenity due to the proximity of infrastructure to recreational areas, and the Port Hedland town site. To identify the potential impacts of the project infrastructure on visual amenity a visual amenity assessment will be conducted. The scope of the assessment includes:

- Compiling a 3D ground and infrastructure model to help assess impacts;
- Undertaking a viewshed analyses showing the proposed infrastructure at full development capacity;
- Preparing photomontages of the development at full capacity from key visual receptors, including cumulative effects from existing RGP4 infrastructure and proposed RGP5 infrastructure; and
- Undertaking a landscape and visual impact assessment using methodology drawn from the Guidelines for Landscape and Visual Impact Assessment.

Potential management strategies may include:

- Use of visual screening near recreational areas, e.g. bunds, tree screens, design of lighting; and
- Construction and rehabilitation of environmental bunds at dredge reclaim areas to shield views of operations.

F 12 European Heritage

A desktop assessment and site visit will be undertaken to investigate European heritage values that may exist within the study area. This encompasses both the terrestrial and marine study areas. The study will include:

- Review literature documenting the European heritage, settlement and establishment of Port Hedland and the surrounding region including historical regional development strategies and profile reports;
- Review the evolution of industry over time and associations with expanding settlements and regional planning and infrastructure;
- Undertake a search of the Register of the National Estate and the Register of the Heritage Council WA and Municipal heritage register for all registered places of historical European heritage significance;
- Undertake a search of the National Shipwrecks Database for shipwrecks that may be located within the study area;
- Review the findings of relevant marine bathymetry and marine geophysical surveys conducted in the study area for evidence of shipwrecks existing in the project footprint; and

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- Should any heritage sites of significance occur within the proposed disturbance footprint, BHPBIO will liaise with relevant stakeholders as part of the study and identifying potential prevention and mitigation measures.

F 13 Recreation

The construction and operation phases of the Outer Harbour Development have the potential to impact on existing recreational activities and areas in Port Hedland. This is relevant to the project in isolation and on a cumulative basis with other projects including:

- Rapid Growth Project 5 and 6;
- Port Hedland Port Authority's Utah Point proposal and Ultimate Development Plan; and
- Fortescue Metal Group's Anderson Point berth development.

Potential impacts will be identified as part of the Social Impact Assessment process being conducted by BHPBIO (refer to Section 8.8). Consideration will be given to:

- Access to recreational activities and areas;
- Population increases and potential increased demand on existing recreational services and areas; and
- Town of Port Hedland's town planning and future vision for recreational services and areas to service the Port Hedland community.

BHPBIO will collaborate with the Town of Port Hedland and assist, where practicable, in maintaining recreational areas.