



**TERMS OF REFERENCE**

**FOR THE**

**POITREL COAL PROJECT**

**ENVIRONMENTAL IMPACT STATEMENT**

**4 February 2005**

# Contents

<b>1. Introduction</b>	<b>9</b>
1.1 Project proponent	9
1.2 Project description	9
1.3 Project objectives and scope	9
1.4 The Environmental Impact Assessment (EIA) process	9
1.4.1 Methodology of the EIS	9
1.4.2 Objectives of the EIS	10
1.4.3 Submissions	10
1.5 Public consultation process	10
1.6 Project approvals	10
1.6.1 Relevant legislation and policy requirements	10
1.6.2 Planning processes and standards	11
1.7 Accredited process for controlled actions under Commonwealth legislation	11
<b>2. Project need and alternatives</b>	<b>12</b>
2.1 Project justification	12
2.2 Alternatives to the project	12
<b>3. Description of the project</b>	<b>12</b>
3.1 Location	12
3.1.1 Regional and local context	12
3.1.2 Resource	12
3.2 Construction	13
3.3 Operations	13
3.3.1 Location and tenure	13
3.3.2 Mine life and coal resource base	14
3.3.3 Mining methods and equipment	14
3.3.4 Mine sequencing	14
3.3.5 Processing and products	15
3.3.6 On-going evaluation and exploration activities	15
3.4 Coal handling	15
3.5 Infrastructure requirements	15
3.5.1 Transport – road/rail/ship	15
3.5.2 Energy	15
3.5.3 Water supply and storage	15
3.5.4 Stormwater drainage	16
3.5.5 Sewerage	16
3.5.6 Accommodation and other infrastructure	16
3.6 Waste management	16
3.6.1 Character and quantities of waste materials	16
3.6.1.1 Air emissions	17
3.6.1.2 Solid waste disposal	17
3.6.1.3 Liquid waste	18
3.7 Financial feasibility	18

3.8	Rehabilitation and decommissioning	18
<b>4.</b>	<b>Environmental values and management of impacts</b>	<b>19</b>
4.1	Land	21
4.1.1	Description of environmental values	21
4.1.1.1	Topography/geomorphology	21
4.1.1.2	Geology	21
4.1.1.3	Mineral resources	21
4.1.1.4	Soils	22
4.1.1.5	Land use	23
4.1.1.6	Infrastructure	23
4.1.1.7	Sensitive environmental areas	23
4.1.2	Potential impacts and mitigation measures	24
4.1.2.1	Land use suitability	24
4.1.2.2	Land disturbance	25
4.1.2.3	Land contamination	25
4.1.2.4	Soil erosion	26
4.2	Climate	27
4.3	Water resources	27
4.3.1	Description of environmental values	27
4.3.1.1	Surface waterways	27
4.3.1.2	Groundwater	28
4.3.2	Potential impacts and mitigation measures	29
4.3.2.1	Surface water and water courses	29
4.3.2.2	Wastewater	30
4.3.2.3	Groundwater	31
4.4	Nature conservation	31
4.4.1	Description of environmental values	31
4.4.1.1	Terrestrial flora	32
4.4.1.2	Terrestrial fauna	33
4.4.1.3	Aquatic biology	34
4.4.2	Potential impacts and mitigation measures	34
4.5	Air quality	36
4.5.1	Description of environmental values	36
4.5.2	Potential impacts and mitigation measures	36
4.6	Noise and vibration	37
4.6.1	Description of environmental values	37
4.6.2	Potential impacts and mitigation measures	38
4.7	Waste management	38
4.7.1	Description of environmental values	38
4.7.2	Potential impacts and mitigation measures	38
4.8	Scenic values	39
4.8.1	Description of environmental values	39
4.8.2	Potential impacts and mitigation measures	40
4.9	Cultural heritage	40
4.9.1	Description of environmental values	40
4.9.2	Potential impacts and mitigation measures	40

4.10	Transport and infrastructure	41
4.10.1	Description of environmental values	41
4.10.2	Potential impacts and mitigation measures	42
4.11	Social	42
4.11.1	Description of environmental values	42
4.11.2	Potential impacts and mitigation measures	43
4.12	Health and safety	44
4.12.1	Description of environmental values	44
4.12.2	Potential impacts and mitigation measures	45
4.13	Economy	45
4.13.1	Description of environmental values	45
4.13.2	Potential impacts and mitigation measures	45
4.14	Hazard and risk	46
4.14.1	Description of environmental values	46
4.14.2	Potential impacts and mitigation measures	47
4.15	Cross-reference with the terms of reference	48
<b>5.</b>	<b>Environmental management plan</b>	<b>48</b>
<b>6.</b>	<b>References</b>	<b>48</b>
<b>7.</b>	<b>Recommended appendices</b>	<b>49</b>
A1.	Final terms of reference for this EIS	49
A2.	The standard criteria	49
A3.	Study team	49
A4.	Technical data	49

## General Instructions

All potentially significant impacts of the proposed project on the environment are to be investigated. Control strategies for the mitigation of any adverse impacts are to be detailed in the Environmental Impact Statement (EIS) report. The focus of the EIS will be on the relevant features of the proposal and the impacts associated with them. It is the responsibility of the proponent to address any issues that arise during the preparation of the EIS that are not covered in these terms of reference (TOR).

The impacts of the project are to be addressed to the degree necessary to enable all relevant decision makers and the general public to be adequately informed. The nature and level of investigations should be relative to the likely extent and gravity of impacts.

The EIS report should consist of three major parts:

- the executive summary;
- the main text of the document, which should be written in a clear and concise manner so as to be readily understood by general readers; and
- a volume of appendices containing detailed technical information.

The following sections of this TOR detail the required content of the EIS report. This information has been set out in a manner that may be adopted as the format for the main text of the EIS report. However, this format need not be followed where the required information can be more effectively presented in an alternative format.

The EIS report should be written so that any conclusions reached can be independently assessed. This means that all sources must be appropriately referenced.

Relevant maps, diagrams and other illustrative materials at easily understood scales which allow proper identification of features such as contour lines, should be included in the EIS report where appropriate.

The EIS report should be produced on A4 size paper capable of being photocopied with maps and diagrams also at A4 or A3. The EIS report should be produced in electronic format (PDF) and made available on the Internet to facilitate accessibility. Copies of the EIS should also be made available at cost of reproduction via means such as compact disc. A minimum text size of 10 point font should be used for PDF documents to facilitate readability.

## Abbreviations

CHMP – Cultural Heritage Management Plan

DES – the Queensland Department of Emergency Services

DET – the Queensland Department of Employment and Training

DHLGP – the former Queensland Department of Housing, Local Government and Planning

DoH – the Queensland Department of Housing

DLGP – the former Queensland Department of Local Government and Planning

DLGPSR – the Queensland Department of Local Government, Planning, Sport and Recreation

DME – the former Queensland Department Mines and Energy

DMR – the Queensland Department of Main Roads

DNRME – the former Queensland Department of Natural Resources, Mines and Energy

DNRM – the Queensland Department of Natural Resources and Mines

DPI – the Queensland Department of Primary Industries

DSDI – the Queensland Department of State Development and Innovation

EIS – Environmental Impact Statement

EM Plan – Environmental Management Plan

EP Act – *Environmental Protection Act 1994*

EPA – the Queensland Environmental Protection Agency

EPBC Act - *Environment Protection & Biodiversity Conservation Act 1999 (Cwth)*

EPPs – Environmental Protection Policies

IAS – Initial Advice Statement

IPA – *Integrated Planning Act 1997*

JORC – the Australasian Joint Ore Reserves Committee

ML – Mining Lease issued pursuant to the *Mineral Resources Act 1989*

MLA – Mining Lease Application issued pursuant to the *Mineral Resources Act 1989*

MRA – *Mineral Resources Act 1989*

QH – the Queensland Department of Health

QT – the Queensland Department of Transport

QR – Queensland Rail

TOR – Terms of reference

## Project Background

### Project Proponent

The Proponent for the Poitrel Coal Project is BHP Mitsui Coal Pty Ltd (BHP MC).

### Project Summary

The Poitrel Coal Project (the project) is an \$80 million coal extraction project with an in-situ coal reserve of approximately 79 million tonnes (Mt). Marketable coal reserves total about 62Mt. Long term extraction rates are likely to be in the order of 3-4Mt per annum of product coal. While the project will be developed as a discreet operation, it is likely that development of the neighbouring Daunia project will follow. During the EIS process for Poitrel, background environmental data will be collected for Daunia to facilitate the preparation of a later and separate EIS for Daunia. Furthermore, there exists an opportunity for Poitrel (and later Daunia) to share infrastructure, including the coal processing plant (CPP), with a new development by Millennium Coal which is planned to be constructed near the northern boundary of the project. Such a shared facility, if technically and commercially feasible, will significantly reduce the collective environmental impact of these coal projects. The project is estimated to have a life of 20 years with an estimated workforce of around 200 persons.

The Poitrel deposit is located in Nebo Shire 35km east southeast of Moranbah, which is approximately 170km southwest of Mackay. The proposed site is adjacent to the Peak Downs / Hay Point railway, 3km north of the Red Mountain Rail siding. The project site lies some 150km from the Dalrymple Bay and Hay Point coal terminals

The mine pit is located within Poitrel Mining Lease (ML) 4749, which has an area of 3964ha and was granted in 1978 and subsequently renewed in 1999. The background tenure for Poitrel ML 4749 is Grazing Homestead Perpetual Lease (GHPL) and Grazing Homestead Freeholding Lease. The Red Mountain ML 70116 will accommodate the industrial area and access to the Peak Downs / Hay Point railway. The area is 754ha and the background tenure is also GHPL, freehold and existing rail corridor leasehold land. Compensation agreements are in place for the proposed mine area within Poitrel ML 4749 and for the entire area of Red Mountain ML 70116.

Approximately 6-7m<sup>3</sup> of overburden will have to be removed for each tonne of coal mined. The most likely method of mining will be open cut, based on using rear dump trucks and excavators. There is the potential to introduce a dragline later in the project. Either method will involve in-pit spoil dumping after the initial box-cut. Coal handling and preparation design capacity is estimated at 800-1000 tonnes per hour (t/hr) of run-of-mine (ROM) coal. Product coal will be reclaimed and loaded into trains using an automated wagon loading system.

The pit and overburden area straddles a low ridgeline that runs north south. This forms the catchment divide between New Chum Creek on the eastern side and an unnamed creek to the west. Both creeks are ephemeral and tributaries of the Isaac River. Both tributaries have been dammed for stock watering. About 5km of New Chum Creek will be diverted to allow access to coal reserves. Levee banks will be constructed beside the Isaac River.

Average slope on the site is 1.5 percent. The gentle slope is towards the creeks and to the south. It is proposed to divert New Chum Creek to the east, to allow access to coal resources.

The project has been referred to the Department of Environment and Heritage as a ‘controlled action’ under the EPBC Act. The controlling provisions are considered to be Section 18 and Section 18A – Threatened Species or Ecological Communities, due to the potential impacts upon two ecological communities - Bluegrass (*Dichanthium spp.*) dominant grasslands of the Brigalow Belt Bioregions and Brigalow (*Acacia harpophylla* dominant and co-dominant).



# Executive Summary

The function of the executive summary is to convey the most important aspects relating to the project to the reader in a concise and readable form. The structure of the executive summary should follow that of the EIS, although focused strongly on the key issues and conclusions.

## Abbreviations

A glossary of abbreviations should be provided.

## 1. Introduction

The function of the introduction is to explain why the EIS has been prepared and what it sets out to achieve. It should also define the audience to whom it is directed, and contain an overview of the structure of the document.

### 1.1 Project proponent

This section should provide details regarding BHP MC, including postal address and key contact details for the BHP MC project staff and project consultants.

### 1.2 Project description

A brief description of the key elements of the project should be provided. Any major associated infrastructure requirements should also be summarised.

### 1.3 Project objectives and scope

A statement of the objectives that have led to the development of the proposal and a brief outline of the events leading up to the proposal's formulation, envisaged time scale for implementation and project life and anticipated establishment costs.

This section should also describe how the project relates to any other actions, of which BHP MC should reasonably be aware that have been, or are being, taken or that have been approved in the area affected by the project.

### 1.4 The Environmental Impact Assessment (EIA) process

The purpose of this section is to make clear the methodology and objectives of the environmental impact assessment under the relevant legislation.

#### 1.4.1 Methodology of the EIS

This section should provide a description of the impact assessment process steps, timing and decisions to be made for relevant stages of the project. This section should also indicate how the consultation process would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation. The information in this section is required to ensure:

- that relevant legislation is addressed;

- there is awareness of the process to be followed; and
- that stakeholders are aware of any opportunities for input and participation.

#### **1.4.2 Objectives of the EIS**

This section should provide a statement of the objectives of the environmental impact assessment process. The structure of the EIS can then be outlined as an explanation of how the EIS will meet its objectives. The purpose of the EIS is to:

- provide public information on the need for and likely effects of the project;
- set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values; and
- demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values.

#### **1.4.3 Submissions**

Interested and affected persons should be made aware of how submissions on the EIS will be addressed and taken into account in the decision-making process. The EIS should inform the reader as to:

- how to make submissions, provide contact details and what form the submissions should take; and
- when submissions must be made to gain standing for any appeal process.

### **1.5 Public consultation process**

The public consultation process should identify broad issues of concern to local community and interest groups and should continue from project planning through commissioning, project operations and final decommissioning. This section should outline the methodology that will be adopted to identify and mitigate socio-economic impacts of the project. Information about the consultation that has already taken place and the results of such consultation should be provided.

The public consultation program should provide opportunities for community involvement and education. It may include public meetings, interest group meetings, production of regular summary information and updates, and other consultation mechanisms to encourage and facilitate active public consultation.

### **1.6 Project approvals**

#### **1.6.1 Relevant legislation and policy requirements**

This section should explain the legislation and policies controlling the approvals process. Reference should be made to the Queensland EP Act, *Water Act 2000*, IP Act, *Aboriginal Cultural Heritage Act 2003* and other relevant Queensland laws. Any requirements of the Commonwealth EPBC Act should also be included.

Local Government planning controls, local laws and policies applying to the development should be described, and a list provided of the approvals required for the project and the expected program for approval of applications.

This information is required to assess how the legislation applies to the proposal, which agencies have jurisdiction.

### **1.6.2 Planning processes and standards**

This section should discuss the project's consistency with existing land uses or long-term policy framework for the area (e.g. as reflected in local and regional plans), and with legislation, standards, codes or guidelines available to monitor and control operations on site. This section should refer to all relevant State and regional planning policies applying to the land, or nearby land that may be impacted upon by the project. Information should be presented on the compatibility of the project with the regional goals and strategies of the *Whitsunday Hinterland and Mackay (WHAM) 2015 Regional Plan*. The impacts of any relevant State Planning Policies applying to the land or nearby land that may be impacted upon by the project should be mapped and assessed. This information is required to demonstrate how the proposal conforms with State, regional and local plans for the area.

### **1.7 Accredited process for controlled actions under Commonwealth legislation**

Projects that are undergoing an EIS under a State statutory process may also be controlled actions under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC). In which case, the Commonwealth may accredit the State's EIS process for the purposes of the Commonwealth's assessment under Part 8 of the EPBC.

When a State EIS process has been accredited, it will be necessary for the terms of reference to address potential impacts on the matters of National Environmental Significance (NES) that were identified in the 'controlling provisions' when the project was declared a controlled action.

As a minimum requirement, the TOR and the EIS should provide separate discussions under sub-headings in the relevant sections that describe the values and address the potential impacts on NES matters. The locations of those sub-headings should be readily identifiable from the Table of Contents.

For example, if one of the controlling provisions was listed threatened species and communities, then subsections, headed 'Matters of national environmental significance', should be placed in Section 4.8 (Nature conservation) under both the Description of environmental values and Potential impacts and mitigation measures headings. Those subsections should address exclusively and fully the issues relevant to the controlling provisions.

Alternatively, a stand-alone report could be provided as an appendix to the EIS that exclusively and fully addresses the issues relevant to the controlling provisions. In which case, it should follow the following template outline:

1. Introduction;
2. Description of proposed action (as it would impact on NES matters);
3. Description of the affected environment relevant to the controlling provisions (i.e. describe the features of the environment that are NES matters protected under the EPBC);
4. Assessment of impacts on NES matters and mitigation measures;
5. Conclusions; and
6. References.

## 2. Project need and alternatives

### 2.1 Project justification

The justification for the project should be described, with particular reference made to the economic and social benefits, including employment and spin-off business development, which the project may provide.

### 2.2 Alternatives to the project

This section should describe feasible alternatives, including conceptual, technological and locality alternatives to the project, and discussion of the consequences of not proceeding with the project.

Alternatives should be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others.

Should water supply, power, transport and/or storage infrastructure be included as an element of the proposal, this section should include a description of and rationale for such infrastructure.

Reasons for selecting the preferred options should consider technical, commercial, social and natural environment aspects, in particular the principles of sustainable development. The relationship of options chosen for waste management and any emissions produced should be detailed.

Provide a detailed assessment of alternative options for waste rock disposal that will not require diversion of local waterways and justify the preferred option.

## 3. Description of the project

The objective of this section is to describe the project through its lifetime of construction and operation and decommissioning. This information is required to allow assessment of all aspects of a proposal including all phases of the proposal. It also allows further assessment of which approvals may be required and how they may be managed through the life of the proposal.

### 3.1 Location

#### 3.1.1 Regional and local context

The regional and local context of the proposal should be described and illustrated on maps at suitable scales. Real property descriptions of the project site should be provided.

#### 3.1.2 Resource

Summarise the results of studies and surveys undertaken to identify and delineate the mineral resource. On the proposed mining lease, the location, tonnage and quality of mineral resource should be described. The geological reserves/resources should be defined using formal terminology as recommended by the Australian Stock Exchange, the Australasian Institute of Mining and Metallurgy and the Australian Mining Industry Council.

Maps should be provided showing the general location of the project area, and in particular:

- the location of the resource to be explored, developed or mined;

- the location and boundaries of mining tenures, granted or proposed, to which the project area is or will be subject;
- the location for mine excavation(s);
- the location of any proposed buffers surrounding the working areas;
- the location and boundaries of the plant site;
- the location of local authority boundaries; and
- the location of current and proposed road and rail alignments.

Consideration should be given to providing an air photo enlargement to illustrate components of the project in relation to natural features of the area.

### **3.2 Construction**

The extent and nature of the project's construction phase should be described. The description should include the type and methods of construction and the construction equipment to be used. Any staging of the proposal should be described and illustrated showing site boundaries, development sequencing and timeframes. The estimated numbers of people to be employed in the project construction phase (including anticipated peaks in worker numbers) should also be provided. An outline of recruitment schedules and policies for recruitment of workers (addressing recruitment of local and non-local workers) should be included. This information should be used to estimate the number of workers who will be accompanied by dependents, as well as those who will be unaccompanied (i.e. single workers).

### **3.3 Operations**

The location and nature of the processes to be used should be described in the text and illustrated with maps, diagrams and artist's impressions as required. Operational issues to be addressed should include, but may not be limited to:

- a description of plant and equipment to be employed;
- the capacity of plant and equipment, and
- chemicals to be used.

Concept and layout plans should be provided highlighting proposed buildings, structures, plant and equipment associated with the processing operation. The nature, sources, location and quantities of all materials to be handled, including the storage and stockpiling of raw materials, should be described.

Indicative process flow-sheets should be provided showing material balances for the processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams.

#### **3.3.1 Location and tenure**

Summarise the results of studies and surveys undertaken to identify the natural resources required to implement the proposal. The location, volume, tonnage and quality of natural resources required should be described (e.g. land, water, forests, energy, etc.). Maps at suitable scales should be provided showing the precise location of the project area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the project area is or will be subject, including the proposed tenure (i.e. private or State owned) of any new rail networks;
- the location and boundaries of the project footprint showing all key aspects including excavations, stockpiles, areas of fill, watercourses, plant locations, road and rail networks water storages, buildings (including any construction workers' accommodation), bridges, culverts, hardstands, car parks, etc; and
- the location of any proposed buffers surrounding the working areas.

Consideration should be given to providing a rectified air photo enlargement to illustrate components of the project in relation to the land and mining tenures and natural and built features of the area.

### **3.3.2 Mine life and coal resource base**

Specific details should be provided of the following:

- the proposed mine life and an outline of the coal resource base (further detail should be provided in section 4.1.1.2, Geology);
- the quantity of coal to be mined annually including any proposed ramping of production or staging of development.

### **3.3.3 Mining methods and equipment**

Specific details should be provided of the following:

- the mining type and methods to be used, including the major equipment to be used in the various components of the operation;
- the use of different techniques in areas of different topographic or geo-technical character;
- chemicals to be used.

The description should refer to, and be complemented by, the figures previously presented in section 3.3.1 showing the locations of key aspects of the project. Additional figures should be provided if required.

### **3.3.4 Mine sequencing**

Specific details should be provided of the following:

- the proposed sequence and timing of mining of each seam within the mining lease;
- the physical extent of excavations, location of overburden stockpiles and extent of coal reject to be handled during the project's operation or left after mining ceases—the description should include the rate of throughput of stockpiles of product, reject and overburden;
- the proposed progressive backfilling of excavations;
- the area disturbed at each major stage of the project.

Information should also be provided on the workforce numbers to be employed in the facility's operations during its various phases (construction, commissioning, operation and decommissioning) and stages with a brief description of where those people may be accommodated and/or how they will be transported to the site. Comment should be made on the anticipated basis of employment (permanent, contract, etc).

### **3.3.5 Processing and products**

This section should describe the quantities and characteristics of the products produced on an annual basis. Indicative process flow-sheets should be provided showing material balances for the processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams.

### **3.3.6 On-going evaluation and exploration activities**

This section should describe the extent and nature of any proposed on-going exploration or geological/geo-technical evaluation within the project area that may be required over the life of the project.

## **3.4 Coal handling**

Describe and show on plans at an appropriate scale the proposed methods and facilities to be used for product storage and for transferring product from the processing plant to the storage facilities and from the storage facilities to the transport facilities. Include discussion of any environmental design features of these facilities including bunding of storage facilities.

This section should also discuss the capacity of the rail networks and coal terminals to handle the proposed coal volumes generated by the project over all phases of development. This discussion should also make reference to the cumulative longer-term demands on coal handling capacity at the coal terminals from all regional coal export proposals, even though the capacity to manage these impacts may fall beyond the scope of this project EIS.

## **3.5 Infrastructure requirements**

This section should provide descriptions and layout plans of requirements for constructing, upgrading or relocating all infrastructure in the vicinity of the project area. The matters to be considered include such infrastructure as roads, rail, bridges, tracks and pathways, dams and weirs, bore fields, power lines and other cables and pipelines for any services.

### **3.5.1 Transport – road/rail/ship**

Arrangements for the transport of plant, equipment, ore, products, wastes and personnel during both the construction phase and operational phases of the project should be briefly described. The traffic impacts should be addressed under Section 4.10 of these TOR.

Details should be provided of new roads, road realignments or proposed road closures required as a result of the project.

### **3.5.2 Energy**

The EIS should describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the proposal. The locations of any easements should be shown on the infrastructure plan.

### **3.5.3 Water supply and storage**

The EIS should provide information on water usage by the project, including the quality and quantity of all water supplied to the mine and processing plant. The proposed sources of water supply should be described (e.g. bores, mine water, any surface storages such as dams and weirs and /or municipal water supply pipelines).

Estimated rates of water supply from the source should be given. Any proposed water conservation and management measures should be described.

Determination of potable water demand should be made for the project, including the temporary demands during the construction period. Details should be provided of any existing town water supply to meet such requirements. If water storage and treatment is proposed on site, for use by the site workforce, then this should be described.

Consideration should be given to the *Water Resource Plan (Fitzroy Basin 1999)* and the *Fitzroy Basin Resource Operations Plan 2004* in relation to any proposals to utilise sources of surface water and the disposal of excess water.

#### **3.5.4 Stormwater drainage**

A brief description should be provided of the proposed stormwater drainage system and the proposed disposal arrangements, including any off-site services. Water management, including stormwater management, should be addressed in detail under Section 4.2 of these TOR.

#### **3.5.5 Sewerage**

The EIS should describe industrial and domestic effluent that will be produced and the proposed method of disposal. The physical and chemical characteristics and expected volumes of such effluent should be addressed in detail under Section 4.2 of these TOR. If discharging into an existing sewerage system, an assessment of the capacity of the existing system to accept the effluent should be provided.

#### **3.5.6 Accommodation and other infrastructure**

A description should be provided of any other developments directly related to the project not described in other sections, such as:

- on-site and/or off-site accommodation for the construction workforce that addresses the estimated housing needs of both single and accompanied construction workers, including maps to illustrate the location, size and management of temporary or permanent worker accommodation on-site or in the vicinity of the project;
- site offices;
- fuel storage areas;
- roads (both haul roads and access roads);
- equipment hardstand and maintenance areas; and
- technical workshops and laboratories.

### **3.6 Waste management**

#### **3.6.1 Character and quantities of waste materials**

Provide an inventory of all wastes to be generated by the proposal during the construction, operational and decommissioning phases of the project. In addition to the expected total volumes of each waste produced, include an inventory of the following per unit volume of product produced:

- the tonnage of raw materials processed;



- the amount of resulting process wastes; and
- the volume and tonnage of any reusable by-products.

Schematic diagrams, which for the operational phase may be simplified versions of those provided in section 3.3, should be provided for each distinct stage of the project (e.g. construction/site preparation, commissioning, operation and decommissioning) indicating the processes to be used and highlighting their associated waste streams (i.e. all waste outputs – solid, liquid and gaseous), including recycling efforts, such as stockpiling and reusing topsoil. The schematic diagrams, or an associated table, should cross-reference the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described. The physical and chemical characteristics of waste material from the process plant should be provided.

Having regard for best practice waste management strategies and the Environmental Protection (Waste) Policy, the proposals for waste avoidance, reuse, recycling, treatment and disposal should be described in the appropriate sub-section below. Information should also be provided on the variability, composition and generation rates of all waste generated at the site and processing plant.

Cleaner production waste management planning should be detailed especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the proposal. Details on natural resource use efficiency (e.g. energy and water), integrated processing design, co-generation of power and by-product reuse as shown in a material/energy flow analysis should be presented.

This information is required to enable the resource management agencies and other stakeholders to assess the efficiency of resource use, and allocation issues.

#### **3.6.1.1 Air emissions**

Describe in detail the quantity and quality of all air emissions (including particulates, fumes and odours) from the project during construction and operation. Particulate emissions include those that would be produced by any industrial process, or disturbed by wind action on stockpiles and conveyors, or by transportation equipment (e.g. trucks, either by entrainment from the load or by passage on unsealed roads).

In the case of a mining operation where fugitive emissions of dust from a variety of open sources is the major pollutant of interest, refer to *National Pollutant Inventory Emissions Estimation Technique Manuals for Mining*, as well as *USEPA Compilation of Air Pollutant Factors AP-42* to identify all potential sources and to estimate emission rates.

The methods to be employed in the mitigation of impacts from air emissions should be described in Section 4.4.

#### **3.6.1.2 Solid waste disposal**

The proposed location, site suitability, dimensions and volume of any landfill, including its method of construction, should be shown.

### **3.6.1.3 Liquid waste**

A description should be presented of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the project. Particular attention should be given to the capacity of wastes to generate acid, and saline or sodic waste water. A water balance for the proposal and processing plant is required to account for the estimated usage of water.

The EIS may need to consider the following effects:

- groundwater from excavations;
- rainfall directly onto disturbed surface areas;
- run-off from roads, plant and industrial areas, chemical storage areas;
- drainage (i.e. run-off plus any seepage or leakage);
- seepage from other waste storages;
- water usage for:
  - process use,
  - dust suppression, and
  - domestic purposes.
- evaporation;
- domestic sewage treatment - disposal of liquid effluent and sludge; and
- water supply treatment plant - disposal of wastes.

### **3.7 Financial feasibility**

This section shall detail the financial feasibility of the proposal, including details of costs of development and ongoing maintenance, operational and decommissioning costs; the capacity of the proponents to satisfactorily develop the project; the costs of decommissioning the project and rehabilitation of the site.

This part of the EIS may be confidential.

### **3.8 Rehabilitation and decommissioning**

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the proposal (including the use of threatened plant species during revegetation with the goal of achieving a nil loss of conservation value). The strategic approach to progressive and final rehabilitation should be described. A preferred rehabilitation strategy should be developed with a view to minimising the amount of land disturbed at any one time. The final topography of any excavations, overburden dumps, waste areas and dam sites should be shown conceptually in plan form.

The rehabilitation methods to be used for the project, including backfilling, landform construction, slope profiling, selective material handling, soil profile construction, covering, re-contouring, drainage, topsoil handling and revegetation, should be described.

The strategies and methods presented for progressive and final rehabilitation of disturbed areas should demonstrate compliance with the objectives of the *Environmental Management Policy for Mining in*

*Queensland (1991)* or with updated versions of that policy as they become available. Land suitability assessment should follow the Technical Guidelines for the *Environmental Management of Exploration and Mining in Queensland (1995)*. In particular, the strategies and methods should have the following objectives:

- Mining and rehabilitation should aim to create a landform with land use capability and/or suitability similar to that prior to disturbance unless other beneficial land uses are pre-determined and agreed;
- Mine wastes and disturbed land should be rehabilitated to a condition that is self-sustaining, or to a condition where the maintenance requirements are consistent with an agreed post mining land use; and
- Surface and ground waters that leave the lease should not be degraded to a significant extent. Current and future water quality should be maintained at levels that are acceptable for users downstream of the site.

The means of decommissioning the proposal, in terms of the removal of plant, equipment, structures and buildings should be described, and the methods proposed for the stabilisation of the affected areas should be given. Information should be provided regarding decommissioning and rehabilitation of the plant site, removal of processing plant, rehabilitation of concrete footings and foundations, hardstand areas and storage tanks (including any potential for reuse of these facilities). Options and methods for the disposal of wastes from the demolition of plant and buildings should be discussed in sufficient detail for their feasibility and suitability to be established.

Proposals to divert creeks during operations, and, if applicable, for the reinstatement of the creeks after operations have ceased, should be provided. Where dams and/or levee banks are to be constructed, proposals for the management and/or removal of these structures after the completion of the project should be given. Also, the final drainage and seepage control systems and long-term monitoring plans should be described.

A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed.

Detail of the impacts of the preferred rehabilitation strategy should be discussed in the appropriate subsections of Section 4 (Environmental values and management of impacts) with regard to such issues as the disposal of waste and the long-term quality of water in any final voids. Implications for the long-term use and fate of the site should also be addressed, particularly with regard to the on-site disposal of waste and the site's inclusion on the Environmental Management Register or Contaminated Land Register.

## **4. Environmental values and management of impacts**

This section should address all elements of the natural and built environment, (such as land, water, air, waste, noise, nature conservation, cultural heritage, housing, transport, social and community, health and safety, and economy) in a way that is comprehensive and clear. To achieve this, the following issues should be considered for each environmental value relevant to the project:

- **environmental values affected** – describe the existing environmental values of the area to be affected including values and areas that may be affected by any cumulative impacts. In the case of the built environment such as rail or roads, environmental values affected should be interpreted to mean the current road characteristics such as width or road condition. Establishing these characteristics will then serve as a benchmark for assessing project impacts and proposing mitigation measures;
- **impact on environmental values** – describe quantitatively the likely impact of the proposal on the identified environmental values of the area. The cumulative impacts of the proposal must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of the Great Barrier Reef Marine Park Authority, relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans should be addressed.  
Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial and aquatic ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the proposal and other proposals competing for use of the local air and water sheds.

Consultative arrangements with other industries in the proposal area to undertake cooperative monitoring and/or management of environmental parameters are recommended;

- **environmental protection objectives** – describe qualitatively and quantitatively the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). Objectives for progressive and final rehabilitation and management of contaminated land should be included;
- **control strategies to achieve the objectives** – describe the control principles, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives. Include designs and relevant performance specifications of plant. For roads, options such as preparing a traffic management plan to formalise agreed strategies for mitigating project impacts on transport should be considered. For example, an agreement between the proponent and the Department of Main Roads to formalise agreed design standards and commitments to funding of requirements such as the construction of the intersection between the mine access road and public roads may be appropriate;
- **monitoring programs** – describe the monitoring parameters, monitoring points, frequency and reporting proposals;
- **auditing programs** – describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed;
- **review strategies** – describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented e.g. continuous improvement framework including details of corrective action options, reporting (including any public reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment; and
- **information quality** – information given under each element should also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling) and what uncertainties (if any) are in the information.

The mitigation measures and monitoring programs identified in this section of the EIS should be used to develop the environmental monitoring programs that will be included in the Environmental Management Plan for the project (see Section 5).

## **4.1 Land**

### **4.1.1 Description of environmental values**

This section describes the existing environment values of the land area that may be affected by the proposal. It should also define and describe the objectives and practical measures for protecting or enhancing land-based environmental values, describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

#### **4.1.1.1 Topography/geomorphology**

Maps should be provided locating the project in both regional and local contexts. The topography of the proposal site should be detailed with contours at suitable increments, shown with respect to Australian Height Datum (AHD). Significant features of the locality should be included on the maps. Such features would include any locations subsequently referred to in the EIS (e.g. the nearest noise sensitive locations) that are not included on other maps in Section 4.1. Commentary on the maps should be provided highlighting the significant topographical features.

#### **4.1.1.2 Geology**

The EIS should provide a description, map and a series of cross-sections of the geology of the proposal area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance. Geological properties that may influence ground stability (including seismic activity, if relevant), occupational health and safety, rehabilitation programs, or the quality of wastewater leaving any area disturbed by the proposal should be described. In locations where the age and type of geology is such that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction/operations, the EIS should address the potential for significant finds.

#### **4.1.1.3 Mineral resources**

The EIS should provide a summary of the results of studies and surveys undertaken to identify and delineate the mineral resources within the project area (including any areas underlying related infrastructure).

The location, tonnage and quality of the mineral resources within the project area should be described in detail as indicated below and, for coal projects, where possible it should be presented on a 'seam by seam' basis and include the modifying factors and assumptions made in arriving at the estimates. The coal resources and reserves should be estimated and reported in accordance with the *Australasian Code for Reporting of Mineral Resources and Ore Reserves* (the JORC Code - available at [www.jorc.org/main.php](http://www.jorc.org/main.php)) and the principles outlined in the *Australian Guidelines for the Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves* (available at [www.jorc.org/pdf/coalguidelines.pdf](http://www.jorc.org/pdf/coalguidelines.pdf)) as appropriate.

In addition, maps (at appropriate scales) should be provided showing the general location of the project area, and in particular:

- the location and areal extent of the mineral resources to be developed or mined;
- the location and boundaries of mining tenures, granted or proposed, to which the project area is, or will be subject;
- the location of the proposed mine excavation(s);
- the location and boundaries of any project sites;
- the location and boundaries of any other features that will result from the proposed mining including waste/spoil dumps, water storage facilities and other infrastructure;
- the location of any proposed buffers, surrounding the working areas; and
- any part of the resource not intended to be mined and any part of the resource that may be sterilised by the proposed mining operations or infrastructure.

#### *Resource Utilisation*

The EIS should analyse the effectiveness of the mining proposal in achieving the optimum utilisation of the coal resources within the project area and consider its impacts on other resources. It should demonstrate that the mining proposal will 'best develop' the mineral resources within the project area, minimise resource wastage and avoid any unnecessary sterilisation of these or any other of the State's coal, mineral, and petroleum (including gas and coal seam methane) resources that may be impacted upon or sterilised by the mining activities or related infrastructure.

#### **4.1.1.4 Soils**

A soil survey of the sites affected by the proposal should be conducted, with particular reference to the physical and chemical properties of the materials that will influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land (e.g. for dry-land cropping, irrigated cropping or grazing uses). Information should also be provided on soil stability and suitability for construction of all project facilities.

Soil profiles should be mapped at a suitable scale and described according to the *Australian Soil and Land Survey Field Handbook* (McDonald et al, 1990) and *Australian Soil Classification* (Isbell, 1996). An appraisal of the depth and quality of useable soil should be undertaken. Information on the extent of good quality agricultural land should be presented in accordance with the planning guideline *Identification of Good Quality Agricultural Land* that supports *State Planning Policy 1/92*.

The requirements for soils mapping in terms of area and mapping scale should follow the *QDME Technical Guidelines for Environmental Management of Exploration and Mining in Queensland, 1995*. These guidelines recommend that disturbed areas be mapped more intensively than non-disturbed areas and provide guidance on acceptable mapping scale and site intensity.

#### **4.1.1.5 Land use**

The EIS should provide a description of current land tenures and land uses, including native title issues, in the proposal area, with particular mention of land with special purposes. The location and owner/custodians of native title in the area and details of native title claims should be shown.

Maps at suitable scales showing existing land uses and tenures, and the proposal location, should be provided for the entire proposal area and surrounding land that could be affected by the development. The maps should identify areas of conservation value in any locality that may be impacted by the proposal. The location of existing dwellings, and the zoning of all affected lands according to any existing town or strategic plan should be included.

A land suitability assessment for rain watered cropping and grazing covering all disturbed and undisturbed areas within the proposed mining lease areas should be provided. The assessment should set out soil and landform limitation subclasses assigned to soil mapping units in order to derive land suitability classes. The limitations and land suitability classification system can be found in Attachment 2 of *Land Suitability Assessment Techniques of the QDME Technical Guidelines for Environmental Management of Exploration and Mining in Queensland, 1995*.

Describe the land use suitabilities of the affected area in terms of the physical and economic attributes. The potential environmental harm caused by the proposal on the adjacent areas currently used for agriculture, urban development, recreation, tourism, other business and the implications of the proposal for future developments in the impact area including constraints on surrounding land uses should be described. The assessment should set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes. The limitations and land suitability classification system to use is that in Attachment 2 of *Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (1995)*.

Provide a land suitability map of the proposed and adjacent area, and setting out land suitability and current land uses, e.g. for grazing of native and improved pastures and horticulture. Land classified as Good Quality Agricultural Land in the Department of Natural Resources and Mines land classification system is to be shown in accordance with the planning guideline *Identification of Good Quality Agricultural Land*, which supports *State Planning Policy 1/92*.

#### **4.1.1.6 Infrastructure**

The location and owner/custodians of all tenures, reserves, roads and road reserves, railways and rail reserves, stock routes and the like, covering the affected land should be shown on maps of a suitable scale. Indicate locations of existing and proposed gas and water pipelines, power lines and any other easements. Describe the environmental values affected by this infrastructure.

#### **4.1.1.7 Sensitive environmental areas**

The EIS should identify whether areas that are environmentally sensitive (including of concern and endangered regional ecosystems and riparian areas) could be affected, directly and indirectly, by the proposal. Areas sensitive to environmental harm caused by the proposal can be determined through site-specific environmental impact assessment.

In particular, the EIS should indicate if the land affected by the proposal is, or is likely, to become part of the protected area estate, or is subject to any treaty. Consideration should be given to national parks, conservation parks, declared fish habitat areas, wilderness areas, aquatic reserves, heritage/historic areas or items, national estates, world heritage listings and sites covered by international treaties or agreements (e.g. Ramsar, JAMBA, CAMBA), areas of cultural significance and scientific reserves (see section 4.7 for further guidance on sensitive areas).

To obtain copies of plans of declared fish habitat areas contact Queensland Fisheries Service of the QDPI at the call centre 13 25 23.

In addition, the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* should be addressed and a determination should be made whether there are national environmentally significant matters that should be described.

The proximity of the proposal elements to any of these areas should be identified.

#### **4.1.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing the land-based environmental values identified through the studies outlined in the previous section. It should describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

##### **4.1.2.1 Land use suitability**

The potential for the construction and operation of the proposal to change existing and potential land uses of the proposal site and adjacent areas should be detailed. Post operations land use options should be detailed including suitability of the area to be used for agriculture, industry, or nature conservation. The factors favouring or limiting the establishment of those options should be given in the context of land use suitability prior to the proposal and minimising potential liabilities for long-term management.

Post mine land use options should be detailed in accordance with the objectives of the *Environmental Management Policy for Mining in Queensland, 1991* and based on a post mine land suitability assessment. The land suitability assessment should follow *QDME Technical Guidelines for Environmental Management of Exploration and Mining in Queensland, 1995*.

If the development adjoins or potentially impacts on good quality agricultural land, then an assessment of the potential for land use conflict is required. Investigations should follow the procedures set out in the planning guideline *Identification of Good Quality Agricultural Land* which supports *State Planning Policy 1/92*.

Outline incompatible land uses, whether existing or potential, adjacent to all aspects of the project, including essential and proposed ancillary developments or activities, and areas directly or indirectly affected by the construction and operation of these activities should be identified and measures to avoid unacceptable impacts should be defined.



#### **4.1.2.2 Land disturbance**

A strategy should be developed with a view to minimising the amount of land disturbed at any one time. The strategic approach to progressive and final decommissioning should be described.

The methods to be used for the proposal, including backfilling, covering, re-contouring, topsoil handling and revegetation, should be described. Consideration should be given to the use of threatened plant species during any landscaping and revegetation.

Proposals should be provided to divert creeks during construction or operations, and, if applicable, for the reinstatement of the creeks. Relevant documents to consider for stream diversion proposals include *ACARP (May 2000) Final Report Maintenance of Geomorphic Processes in Bowen Basin River Diversions C8030*, and *ACARP (January 2001) Final Report Monitoring Geomorphic Processes in Bowen Basin River Diversions C9068*. Where dams and roads and other infrastructure are to be constructed, proposals for the management of these structures after the completion of the proposal should be given. A contour map of the area should be provided (if relevant). Also, the final drainage and seepage control systems and any long-term monitoring plans should be described.

Proposed decommissioning should be described in detail, including consolidation, revegetation, fencing, and monitoring.

A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas, and how the utilisation of topsoil suitable for rehabilitation purposes will be maximised. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed. Erosion and sediment control measures should be described, particularly in the context of managing sodic and saline overburden material (also see Section 4.1.12).

Information should be provided regarding decommissioning of any plant site, removal of processing plant, rehabilitation of concrete footings and foundations, hard stand areas and storage tanks (including any potential for reuse of these facilities).

If geological conditions are conducive, the proponent should consider the possibility that significant fossil specimens (such as of dinosaurs or their tracks) may be uncovered during construction/operations and propose strategies for protecting the specimens and alerting the Queensland Museum to the find.

#### **4.1.2.3 Land contamination**

The EIS should describe the possible contamination of land from aspects of the proposals including waste, reject product, acid generation from exposed sulfidic material and spills at chemical and fuel storage areas.

The means of preventing land contamination (as defined by the Queensland *Environmental Protection Act 1994*) should be addressed. Methods proposed for preventing, recording, containing and remediating any contaminated land should be outlined. Intentions should be stated concerning the classification (in terms of the Queensland Contaminated Land Register) of land contamination on the land, processing plant site and product storage areas after proposal completion.

A Preliminary Site Investigation (PSI) of the site consistent with the EPA's *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (refer to references section – Queensland EPA, 1998) should be undertaken to determine background contamination levels. The results of the PSI should be summarised in the EIS.

If the results of the preliminary site investigation indicate potential or actual contamination, a detailed site investigation progressively managed in accordance with the stages outlined in Appendix 5 of the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* should be undertaken.

In short, the following information may be required in the EIS:

- mapping of any areas listed on the Environmental Management Register or Contaminated Land Register under the *Environmental Protection Act 1994*;
- identification of any potentially contaminated sites not on the registers which may need remediation; and
- a description of the nature and extent of contamination at each site and a remediation plan and validation sampling.

The EIS should address management of any existing or potentially contaminated land in addition to preventing and managing land contamination resulting from project activities. The *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* can be downloaded from the EPA website at: [www.epa.qld.gov.au/environment/business/contaminated](http://www.epa.qld.gov.au/environment/business/contaminated)). Proponents should refer study proposals to the EPA for review prior to commencement (consult with the contaminated land section in the Queensland EPA).

#### **4.1.2.4 Soil erosion**

For all permanent and temporary landforms, possible erosion rates and management techniques should be described. For each soil type identified, erosion potential (wind and water) and erosion management techniques should be outlined. To minimise erosion potential, vegetation ground cover should meet the requirements identified in the *Central Queensland Strategy for Sustainability* and the *Isaac/Connors Natural Resource Management Plan*. An erosion monitoring program, including rehabilitation measures for erosion problems identified during monitoring, should also be outlined. Mitigation strategies should be developed to achieve acceptable soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations.

The report should include an assessment of likely erosion effects, especially those resulting from the removal of vegetation, both on-site and off-site for all disturbed areas such as:

- the plant site, including buildings;
- access roads or other transport corridors;
- any waste dumps; and
- dams, banks and creek crossings.

Methods proposed to prevent or control erosion should be specified and should be developed with regard to (a) preventing soil loss in order to maintain land capability/suitability, and (b) preventing significant degradation of local waterways by suspended solids.

## **4.2 Climate**

This section should describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect air quality within the environs of the proposal. Extremes of climate (droughts, floods, cyclones, etc) should also be discussed with particular reference to water management at the proposal site. The vulnerability of the area to natural or induced hazards, such as floods and bushfires, should also be addressed. The relative frequency, magnitude and risk of these events should be considered.

The potential impacts due to climatic factors should be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion should be addressed in Section 4.1. The impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) should be addressed in Section 4.3 with regard to contamination of waterways and in Section 4.6 with regard to the design of waste containment systems. The impacts of winds, rain, humidity and temperature inversions on air quality should be addressed in Section 4.4.

## **4.3 Water resources**

### **4.3.1 Description of environmental values**

This section describes the existing environment for water resources, which may be affected by the proposal, in the context of environmental values as defined by the EP Act and EPPs.

Describe the environmental values of the surface waterways of the affected area in terms of:

- values identified in Section 7 of the *Environmental Protection (Water) Policy*;
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form;
- ecological and hydrologic processes and relationships between the floodplain and the riverine environment; and
- any water resource plans, land and water management plans relevant to the affected catchment.

Describe the environmental values of the groundwater in terms of:

- values identified in the *Environmental Protection (Water) Policy*;
- sustainability, including both quality and quantity; and
- physical integrity, fluvial processes and morphology of groundwater resources.

#### **4.3.1.1 Surface waterways**

A description should be given of the surface water courses, including springs and wetlands if any, and their quality and quantity in the area affected by the proposal with an outline of the significance of these waters to

the river catchment system in which they occur. Details provided should include a description of existing surface drainage patterns, flows in major streams and wetlands. Also provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the proposal. Flood studies should include a range of annual exceedance probabilities for affected waterways, where data permits.

An assessment of the pre-mine geomorphic condition of watercourses likely to be affected by disturbance such as stream diversions should be carried out. The results of the assessment should form the basis of future monitoring programs for stream geomorphic condition and the physical integrity of affected watercourses within the project area.

An assessment is required of existing water quality in surface waters and wetlands likely to be affected by the proposal. Complementary stream-flow data should also be obtained from historical records (if available) to aid in interpretation.

The water quality should be described, including seasonal variations or variations with flow where applicable. Relevant physical, chemical and biological parameters should be discussed to gauge the environmental harm on any affected creek or wetland system.

#### **4.3.1.2 Groundwater**

The EIS should review the quality, quantity and significance of groundwater in the proposal area, together with groundwater use in neighbouring areas.

The review should include a survey of existing groundwater supply facilities (bores, wells, or excavations) to the extent of any environmental harm. The information to be gathered for analysis is to include:

- location;
- pumping parameters;
- draw down and recharge at normal pumping rates; and
- seasonal variations (if records exist) of groundwater levels.

A network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations should be developed.

This section should include reference to:

Nature of the aquifer/s

- geology/stratigraphy - such as alluvium, volcanic, metamorphic;
- aquifer type - such as confined, unconfined; and
- depth to and thickness of the aquifers.

### Hydrology of the aquifer/s

- depth to water level and seasonal changes in levels;
- groundwater flow directions (defined from water level contours);
- interaction with surface water;
- possible sources of recharge; and
- vulnerability to pollution.

The data obtained from the groundwater survey should be sufficient to enable specification of the major ionic species present in the groundwater, pH, electrical conductivity and total dissolved solids.

#### **4.3.2 Potential impacts and mitigation measures**

This section is to define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved and how the achievement of the objectives will be monitored, audited and managed.

Describe the potential impacts of the proposed levee banks on the ecological and hydrologic processes and relationships between the floodplain and the riverine environment. Include an assessment of the likely impacts on the relationship between the hydrologic/hydraulic functions and the ecological and physical integrity of the riverine environment both in the area adjacent to the levee banks and upstream and downstream of the project area.

Detail proposed water management strategies to mitigate the likely adverse impacts of the levee banks during mine life and post-mining, if relevant. Water management controls should be described, addressing surface and groundwater quality, quantity, drainage patterns and sediment movements. The beneficial (environmental, production and recreational) use of nearby surface and groundwater should be discussed, along with the proposal for the diversion of affected creeks during mining, and the stabilisation of those works. Monitoring programs should be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the proposal. Monitoring programs should be designed to evaluate changes in the physical integrity and geomorphic processes associated with stream diversions and levee bank construction.

Key water management strategy objectives include:

- replication of local water courses and maintenance of the existing geomorphic condition for all stream diversions;
- protection of local aquifers and protection of their waters, and
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota).

##### **4.3.2.1 Surface water and water courses**

The potential changes to the flow and the quality of surface waters from all phases of the proposal should be discussed, with particular reference to their suitability for the current and potential downstream uses, including the requirements of any affected riparian area, any spring, wetland and in-stream biological uses.

Quality characteristics discussed should be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water (including concentrations of constituents) at the point of entering natural surface waters should be discussed along with toxicity of effluent constituents to flora and fauna.

Reference should be made to the technology for settling suspended clays from contaminated water, and the techniques to be employed to ensure that contaminated water is successfully treated (settled) on the site.

In relation to water supply and usage, and wastewater disposal, the EIS should discuss anticipated flows of water to and from the project area. The potential impact of the project on the reliability and quality of water supply for downstream users should be discussed. Where dams, weirs, creek diversions, levee banks or ponds are proposed, the EIS should investigate the effects of predictable climatic extremes (droughts, floods) upon the structural integrity of the containing walls; and the quality of water contained, and flows and quality of water discharged. The design of all water storage facilities should follow the technical guidelines on site water management.

The need or otherwise for licensing of any dams or creek diversions, under the *Water Act 2000* should be discussed. Water allocation and water sources should be established in consultation with Department of Natural Resources and Mines

The Australian and New Zealand Environment and Conservation Council (ANZECC) *National Water Quality Management Strategy, Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC 2000) and the *Environmental Protection (Water) Policy 1997* should be used as a reference for evaluating the effects of various levels of contamination.

#### **4.3.2.2 Wastewater**

A description should be presented of the origin, quality and quantity of wastewater originating from the project. Particular attention should be given to the capacity of wastes to generate acid, and saline or sodic waste water, or contaminants such as sediment, metals and other potentially toxic chemicals. A water balance for the proposal and processing plant is required to account for the estimated usage of water.

The EIS may need to consider the following effects:

- groundwater from excavations;
- rainfall directly onto disturbed surface areas;
- run-off from roads, plant and industrial areas, chemical storage areas;
- seepage from waste storages;
- water usage for -
  - process use,
  - dust suppression, and
  - domestic purposes;
- evaporation;
- domestic sewage treatment - disposal of liquid effluent and sludge; and

- water supply treatment plant - disposal of wastes.

Having regard for the requirements of the *Environmental Protection (Water) Policy 1997*, the EIS should present the methods to avoid stormwater contamination by raw materials, wastes or products and present the means of containing, recycling, reusing, treating and disposing of stormwater. Where no-release water systems are to be used, the fate of salts and particulates derived from intake water should be discussed.

Mitigation measures should be discussed with particular reference to any hazardous or toxic releases.

#### **4.3.2.3 Groundwater**

The EIS should include an assessment of the potential environmental harm to the local groundwater resource, including its water quality.

The impact assessment should define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the proposal to groundwater depletion or recharge, and propose management options available to monitor and mitigate these effects. The response of the groundwater resource to the progression and finally cessation of the proposal should be described.

The management and/or disposal of groundwater that may enter the pit during the operational phase of the project should be described. Furthermore, the likely quality of water in the final void, together with its use and management post mining should be discussed.

### **4.4 Nature conservation**

#### **4.4.1 Description of environmental values**

This section describes the existing environment values for nature conservation that may be affected by the proposal in the context of environmental values as defined by the EP Act, EPPs, the *Nature Conservation Act 1992* and other relevant legislation.

Describe the environmental values of nature conservation for the affected area in terms of:

- regional ecosystems (regional ecosystem mapping – version 4) and the conservation status of each regional ecosystem;
- integrity of ecological processes, including habitats of rare and threatened species;
- conservation of resources;
- biological diversity, including habitats of rare and threatened species;
- integrity of landscapes and places including wilderness and similar natural places; and
- aquatic and terrestrial ecosystems.

The flora and fauna communities which are rare or threatened and environmentally sensitive localities including waterways, riparian zones and habitat corridors should be described. The description should include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and State perspective. The description should indicate any areas of State or regional significance identified in an approved biodiversity planning assessment produced by the

EPA (e.g. see the *Draft Regional Nature Conservation Strategy for SE Qld 2001-2006*). The EIS should identify the regional ecosystem/s to be cleared, area of each regional ecosystem to be cleared and their conservation status.

The EIS should identify issues relevant to sensitive areas or areas which may have low resilience to environmental change. Areas of special sensitivity include wetlands, wildlife breeding or roosting areas, any significant habitat or relevant bird flight paths for migratory species, bat roosting and breeding caves, and habitat of threatened plants, animals and communities. The capacity of the environment to assimilate discharges/emissions should be assessed. Proposal proximity to any biologically sensitive areas should be described.

Reference should be made to both State and Commonwealth endangered species legislation and the proximity of the area to the Great Barrier Reef World Heritage Property.

The *Vegetation Management Act 1999* and the findings of any regional vegetation management plan should also be referenced.

The occurrence of pest plants and animals in the project area should be described.

Key flora and fauna indicators should be identified for future ongoing monitoring.

#### **4.4.1.1 Terrestrial flora**

For terrestrial vegetation a map at a suitable scale should be provided, with descriptions of the units mapped. Sensitive or protected vegetation types should be highlighted, including any riparian vegetation, and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types. The existence of rare or threatened species should be specifically addressed. The surveys should include species structure, assemblage, diversity and abundance. The description should contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests.

The location of any horticultural crops in the vicinity of the site should be shown. The existence of local and regional weed species should also be discussed.

Vegetation mapping should provide vegetation mapping for all relevant project sites. Adjacent areas may also require mapping.

The terrestrial vegetation communities within the affected areas should be described at an appropriate scale with mapping produced from aerial photographs and ground truthing, showing the following:

- location and extent of vegetation types using the EPA's regional ecosystem type descriptions in accordance with *The Conservation Status of Queensland's Bioregional Ecosystems* (Sattler P.S. & Williams R.D. 1997 2<sup>nd</sup> edition) and the EPA's Website listing the biodiversity status of regional ecosystems;



- location of vegetation types of biodiversity significance based on EPA's regional ecosystem types and occurrence of species listed as protected plants under the *Nature Conservation (Wildlife) Regulation 1994* and subsequent amendments, as well as areas subject to the *Vegetation Management Act 1999*;
- any plant communities of cultural, commercial or recreational significance should be identified; and
- a description of any exotic or weed species.

Within each defined regional ecosystem, suitable sites should be surveyed for plant species as follows:

- site data should be recorded in a form compatible with the Queensland Herbarium CORVEG database.
- the minimum site size should be 10 by 50 metres;
- a complete list of species present at each site should be recorded;
- the relative abundance of plant species present should be recorded;
- any plant species of conservation, cultural, commercial or recreational significance should be identified; and
- specimens of species listed as Protected Plants under the *Nature Conservation (Wildlife) Regulation 1994*, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

Existing information on plant species may be used in addition to new survey work.

#### **4.4.1.2 Terrestrial fauna**

The terrestrial, and riparian fauna occurring in the areas affected by the proposal should be described, noting the broad distribution patterns in relation to vegetation, topography and substrate. Fauna surveys should be conducted throughout the year (during both day and night) to reflect seasonal variation in species and to identify migratory species. Survey site locations, conditions at the time of survey and methodology of sampling should be provided along with additional information sources used to identify species likely to occur. The EPA should be consulted on the methodology and scope of any fauna surveys before they are undertaken.

The description of the fauna present or likely to be present in the area should include:

- species diversity (i.e. a species list) and abundance of animals, including amphibians, birds, reptiles, mammals and bats;
- any species which are poorly known but suspected of being rare or threatened;
- habitat requirements and sensitivity to changes; including movement corridors and barriers to movement;
- the existence of feral or exotic animals;
- existence of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of Protected Area Management Plans); and
- use of the area by migratory birds, nomadic birds, fish and terrestrial fauna.

The EIS should indicate how well any affected communities are represented and protected elsewhere in the province where the site of the proposal occurs.

#### **4.4.1.3 Aquatic biology**

If no biota surveys/studies have previously been conducted in and downstream of the project area, the aquatic flora and fauna occurring in the areas affected by the proposal should be described, noting the patterns and distribution in the waterways. The description of the fauna and flora present or likely to be present in the area should include:

- fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area, and downstream;
- any rare or threatened species;
- aquatic plants;
- aquatic and benthic substrate; and
- potentially impacted habitat downstream of the project.

#### **4.4.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing nature conservation environmental values, describes how nominated quantitative standards and indicators may be achieved for nature conservation management, and how the achievement of the objectives will be monitored, audited and managed.

The discussion should cover all likely direct and indirect environmental harm on flora and fauna particularly sensitive areas as listed below. Terrestrial and aquatic environments should also be covered. The potential impact on wildlife (such as marsupial and bird strike) as a result of increased traffic on the haul road should be discussed. Also discuss human impacts and the control of any domestic animals introduced to the area.

Strategies for protecting World Heritage Property and any rare or threatened species should be described, and any obligations imposed by State or Commonwealth legislation or policy or international treaty obligations (i.e. JAMBA, CAMBA) should be discussed. Emphasis should be given to potential environmental harm to benthic communities.

Strategies for collecting and preserving any significant fossils should be described.

The potential environmental harm to the ecological values of the area arising from the construction, operation and decommissioning of the project including clearing, salvaging or removal of vegetation should be described, and the indirect effects on remaining vegetation should be discussed. Short-term and long-term effects should be considered with comment on whether the effects are reversible or irreversible. Mitigation measures and/or offsets should be proposed for adverse impacts occurring to of concern and endangered regional ecosystems and riparian areas. Consideration should be given to the use of threatened plant species during revegetation with the goal of achieving a no-net-loss of conservation value. Any departure from no-net-loss of ecological values should be described.

The potential environmental harm on flora and fauna of any alterations to the local surface and ground water environment should be discussed with specific reference to environmental harm on riparian vegetation or other sensitive vegetation communities. Measures to mitigate and/or offset the environmental harm to habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains should be described. Proposed creek diversions and revegetation of man-made riparian areas should be discussed to show how impacts on revegetated riparian ecosystems will be minimised and, if possible, offset.

The provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory, nomadic and aquatic animals should be discussed.

Weed control strategies aimed at containing existing weed species (e.g. parthenium and other noxious weeds) and ensuring no new invasive weeds are introduced to the area are required, and feral animal management strategies should be addressed. The study should develop strategies to ensure that the project does not contribute to increased encroachment of a feral animal species. Reference should be made to the local government authority pest management plan when determining control strategies.

Rehabilitation of disturbed areas should incorporate, where appropriate, provision of nest hollows (on and above ground) and ground litter.

Areas regarded as sensitive with respect to flora and fauna have one or more of the following features (and which should be identified, mapped, avoided or effects minimised):

- habitats of species listed under the *Nature Conservation Act 1992* and/or Commonwealth EPBC Act as presumed extinct, endangered, vulnerable or rare;
- regional ecosystems recognised by the Environmental Protection Agency as endangered or of concern and/or ecosystems listed as presumed extinct, endangered or vulnerable under the Commonwealth EPBC Act;
- good representative examples of remnant regional ecosystems or regional ecosystems which are poorly represented in protected areas;
- sites listed under international treaties such as RAMSAR wetlands and World Heritage areas;
- sites containing near threatened or bio-regionally significant species or essential, viable habitat for near threatened or bio-regionally significant species;
- sites in, or adjacent to, areas containing resting, feeding or breeding sites for migratory species of conservation concern listed under the *Convention of Migratory Species of Wild Animals*, and/or bilateral agreements between Australia and Japan (JAMBA) and between Australia and China (CAMBA);
- sites adjacent to nesting beaches, feeding, resting or calving areas of species of special interest;
- sites containing common species which represent a distributional limit and are of scientific value or which contains feeding, breeding, resting areas for populations of echidna, koala, platypus and other species of special cultural significance;
- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term. Such land may contain –
  - natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or

- degraded vegetation or other habitats that still supports high levels of biodiversity or acts as a corridor for maintaining high levels of biodiversity in the area;
- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism;
- ecosystems which provide ecological functions such as: wetlands of national, State and regional significance; riparian vegetation; buffer to a protected area or habitat corridor between areas;
- sites of palaeontologic significance such as fossil sites;
- protected areas which have been proclaimed under the *Nature Conservation Act 1992* and *Marine Parks Act 1982* or are under consideration for proclamation; and/or
- areas of major interest, or critical habitat declared under the *Nature Conservation Act 1992* or high nature conservation value areas or areas vulnerable to land degradation under the *Vegetation Management Act 1999*.

## **4.5 Air quality**

### **4.5.1 Description of environmental values**

This section describes the existing air environment, which may be affected by the proposal in the context of environmental values as defined by the EP Act and EPPs.

A description of the existing air shed environment should be provided having regard for particulates and gaseous and odorous compounds. The background levels and sources of suspended particulates, and any other major constituent of the air environment which may be affected by the proposal should be discussed.

Sufficient data on local meteorology and ambient levels of pollutants should be gathered to provide a baseline for later studies or for the modelling of air quality environmental harms within the air shed. Parameters should include air temperature, wind speed and direction, atmospheric stability, mixing depth and other parameters necessary for input to the models.

### **4.5.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values for air, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

The objectives for air emissions should be stated in respect of relevant standards (ambient and ground level concentrations), relevant emission guidelines, and any relevant legislation. The ground level concentration should be modelled using a recognised atmospheric dispersion model. Information such as the estimated emissions of PM10 and total suspended particles, diurnal variation or episodic levels of emission rates, wind speed and rainfall will be needed for modelling impacts of both concentration and deposition of dust emissions. The potential for interaction between any emissions from the CPP, and emissions in the air shed, and the likely environmental harm from any such interaction, should also be detailed.

The proposed levels of emissions should be compared with the current *Draft National Environmental Protection Measures (1997)* for ambient air quality, the National Health Medical Research Council (NHMRC) *National Guidelines for Control of Emissions from Stationary Sources 1985*, and the *Environmental Protection (Air) Policy 1997*.

Where appropriate, the predicted average ground level concentrations in nearby areas should be provided. These predictions should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions should be identified and modelled where necessary. Ground level predictions should be made at any nearby residential, industrial and agricultural developments believed to be potentially affected and sensitive to the effects of the emissions. The techniques used to obtain the predictions should be referenced, and key assumptions and data sets explained. The assessment of the proposal's impact, i.e. environmental harm, on air quality should consider the following matters:

- features of the proposal designed to suppress or minimise dusts should be detailed;
- the proposed levels of emissions of dust should include emissions during normal and upset conditions. Consideration should be given to the range of potential upset condition scenarios including the air emissions that may be generated as a result;
- the limitations and accuracy of the applied atmospheric dispersion models should be discussed. The air quality modelling results should be discussed in light of the limitations and accuracy of the applied models;
- air quality predictions should be compared to the relevant goals in the *National Environmental Protection Council (Ambient Air Quality) Measure* and the *Environmental Protection (Air) Policy 1997* goals; and
- air shed management and the contribution of the proposal to air shed capacity in view of existing and future users of the air shed for assimilation and dispersion of emissions.

### **Greenhouse gas abatement**

An assessment of greenhouse gas emissions from the project should be provided including:

- an inventory of proposed future annual emissions for relevant greenhouse gases and total emissions expressed in 'CO<sub>2</sub> equivalent' terms;
- the intended measures to avoid and minimise greenhouse emissions; and
- opportunities for offsetting greenhouse gas emissions, such as through forestry plantations, investing in renewable energy projects, purchase of renewable energy or support for relevant research.

The above assessment should be undertaken with due consideration of relevant protocols, agreements and strategies including The National Greenhouse Strategy, National Greenhouse Gas Inventory, The Kyoto Protocol and The Framework Convention on Climate Change, Queensland Government Energy Policy, Queensland Implementation Plan, and voluntary programs under the Australian Greenhouse Office.

## **4.6 Noise and vibration**

### **4.6.1 Description of environmental values**

This section describes the existing environment values that may be affected by noise and vibration from the proposal in the context of environmental values as defined by EP Act and EPPs.

If the proposed activity could adversely impact on the noise environment, baseline monitoring should be undertaken at a selection of sensitive sites affected by the proposal. Noise sensitive places are defined in the *Environmental Protection (Noise) Policy 1997*. The locations of sensitive sites should be identified on a map

at a suitable scale. The results of any baseline monitoring of noise and vibration in the proposed vicinity of the proposal should be described.

Sufficient data should be gathered to provide a baseline for later studies. The daily variation of background noise levels at nearby sensitive sites should be monitored and reported in the EIS, with particular regard given to detailing variations at different periods of the night. Monitoring methods should adhere to relevant Environmental Protection Agency Guidelines and Australian Standards, and any relevant requirements of the *Environmental Protection (Noise) Policy 1997*.

Comment should be provided on any current activities near the proposal area that may cause a background level of ground vibration.

#### **4.6.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by noise and vibration, describes how nominated quantitative standards and indicators may be achieved for noise and vibration management, and how the achievement of the objectives will be monitored, audited and managed.

Information, including mapped noise contours from a suitable acoustic model, should be submitted on the proposed generation of noise. The potential environmental harm of noise and vibration at all potentially sensitive places, in particular, any place of work or residence should be quantified in terms of objectives, standards and indicators to be achieved. This should also include environmental harm on terrestrial and avifauna particularly migratory species. Proposals for buffers to minimise or eliminate these effects including details of any screening, lining, enclosing or bunding should be provided. Timing schedules for construction and operations should be discussed with respect to minimising environmental impacts from noise.

Information should be supplied on blasting which might cause ground vibration or fly rock on or adjacent to the site with particular attention given to State-controlled and local roads, places of work or residence, recreation, worship and general amenity. Measures to manage identified impacts should be outlined. The magnitude, duration and frequency of any vibration should be discussed. Measures to prevent or minimise environmental harm, including nuisance, should be discussed. Off-site transport noise and vibration factors due to road or rail should be described.

Consideration should be given to the emission of low-frequency noise (noise with components below 200Hz) from major items of plant or equipment and, if necessary, measures should be described for reducing the intensity of these components.

### **4.7 Waste management**

#### **4.7.1 Description of environmental values**

This section describes the existing environment values that may be affected by the project's wastes in the context of environmental values as defined by the EP Act and EPPs.

#### **4.7.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes, describes how nominated quantitative standards and

indicators may be achieved for waste management, and how the achievement of the objectives will be monitored, audited and managed.

This section should assess the potential impact of all wastes to be generated and provide details of each waste in terms of:

- operational handling and fate of all wastes including storage;
- on-site treatment methods proposed for the wastes;
- methods of disposal (including the need to transport wastes off-site for disposal) proposed to be used for any trade wastes, liquid wastes and solid wastes;
- the potential level of impact on environmental values;
- proposed discharge/disposal criteria for liquid and solid wastes;
- measures to ensure stability of the dumps and impoundments should be described;
- methods to prevent seepage and contamination of groundwater from stockpiles and/or dumps should be given;
- market demand for recyclable waste (where appropriate) should be addressed;
- waste minimisation techniques processes proposed; and
- decommissioning of the site.

Having regard for the Environmental Protection (Waste) Policy, the EIS should indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all phases of the proposal. The EPA has also released draft guidelines covering aspects of waste management under this EPP, which should be addressed.

Waste minimisation and treatment, and the application of cleaner production techniques, should also be applied to gaseous wastes, particularly nitrogen oxides, sulfur oxides, particulates and carbon dioxide. Particular attention should be paid to measures, which will maximise energy efficiency and minimise internal energy consumption in the proposal.

Cleaner production waste management planning should be detailed especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the proposal. Details on natural resource use efficiency (e.g. energy and water), integrated processing design, co-generation of power and by-product reuse as shown in a material/energy flow analysis are required.

## **4.8 Scenic values**

### **4.8.1 Description of environmental values**

The EIS should describe scenic values of the various project sites as viewed from places of residence, from road and other known vantage points day and night. Sketches, computer imaging and photos may be used where appropriate to portray the near views and far views of the mining and infrastructure areas, and their surroundings, from visually sensitive locations.

Special consideration is to be given to public roads, public thoroughfares, and places of residence or work that are within the line-of-sight of the project.

#### **4.8.2 Potential impacts and mitigation measures**

This section should discuss the visual impact of the construction and operation of the project as it relates to the surrounding landscape. The assessment should address the local and broader visual impacts of the project structures. Appropriate simulation to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations should be utilised. The significance of any clearing of vegetation, from a local amenity, landscape and visual perspective should be discussed.

Information should be supplied on any techniques proposed to minimise visual impacts.

Details of the design and colour of any major structures, buildings or fixed plant and any proposed screenings either vegetative or material should be described and discussed where relevant to the minimisation of the visual impacts of the project.

Major illumination or reflection impacts on adjacent properties or roads should be addressed. Details of management of lighting for all stages of the project should be provided, with particular reference to the objectives and proposed management regime to mitigate or avoid:

- night operations and maintenance activities;
- the effects of lighting on fauna and residents; and
- changed habitat conditions for nocturnal fauna and associated impacts.

#### **4.9 Cultural heritage**

##### **4.9.1 Description of environmental values**

This section describes the existing cultural heritage values that may be affected by the proposal. Describe the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms.

A cultural heritage study may be required that will describe indigenous and non-indigenous cultural heritage sites and places, and their values. In accordance with the *Aboriginal Cultural Heritage Act 2003*, such a study must be endorsed by the relevant Aboriginal people and must include the following:

- liaison with relevant indigenous community/communities concerning:
- places of significance to that community (including archaeological sites, natural sites, story sites etc);
- appropriate community involvement in field surveys;
- any requirements by communities and/or informants relating to confidentiality of site data must be highlighted. Non-indigenous communities may also have relevant information;
- a systematic survey of the proposed development area to locate and record indigenous and non-indigenous cultural heritage places;
- significant assessment of any cultural heritage sites/places located; and
- the impact of the proposed development on cultural heritage values.

##### **4.9.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing cultural heritage environmental values, describes how nominated quantitative standards and indicators may be



achieved for cultural heritage management, and how the achievement of the objectives will be monitored, audited and managed.

The environmental harm to cultural heritage values in the vicinity of the project should be managed under a CHMP developed specifically for the project. The CHMP will provide a process for the management of cultural heritage places both identified and sub-surface at the project sites. It is usual practice for the CHMP to be based on information contained in archaeological and/or anthropological reports on the survey area and cultural reports and/or information from affiliated traditional owners. The CHMP should address and include the following:

- a process for including Aboriginal people associated with the development areas in protection and management of indigenous cultural heritage;
- processes for mitigation, management and protection of identified cultural heritage places and material in the project areas, including associated infrastructure developments, both during the construction and operational phases of the project;
- provisions for the management of the accidental discovery of cultural material, including burials;
- the monitoring of foundation excavations and other associated earthwork activities for possible sub-surface cultural material; and
- cultural awareness training or programs for project staff.

#### **4.10 Transport and infrastructure**

##### **4.10.1 Description of environmental values**

Describe arrangements for the transport of plant, equipment, products, wastes and personnel during both the construction phase and operational phases of the project. The description should address the use of existing facilities and all requirements for the construction, upgrading or relocation of any transport related infrastructure.

Provide details of proposed use of rail for transport of materials, products or wastes to or from the project site including the proposed tonnages of materials to be transported by rail per annum. Any requirement for railway crossings should also be discussed. In relation to shipping of products, details of the number of ships should be documented.

Information should be provided on road transportation requirements on public roads for both construction and operations phases, including:

- the volume, composition (types and quantities), origin and destination of goods to be moved including construction materials, plant, raw materials, wastes, hazardous materials, finished products;
- the volume of traffic generated by workforce personnel, visitors and service vehicles;
- method of movement (including vehicle types and number of vehicles likely to be used);
- anticipated times at which movements may occur;
- details of vehicle traffic and transport of heavy and oversize indivisible loads (including types and composition);
- the proposed transport routes; and

- need for increased road maintenance and upgrading.

#### **4.10.2 Potential impacts and mitigation measures**

The EIS should provide sufficient information to make an independent assessment of how the rail networks and State-controlled and local government road networks will be affected by all aspects of the project. An assessment of the potential flooding impacts of diverting New Chum Creek and constructing levee banks along the Isaac River on State-controlled and local roads should be undertaken, and mitigation strategies agreed to by Main Roads and local government should be outlined. The proponent should refer to the Main Roads' *Guidelines for Assessment of Road Impacts of Development Proposals* (available at [www.mainroads.qld.gov.au](http://www.mainroads.qld.gov.au)) to assess project impacts and develop mitigation measures for State-controlled roads in consultation with the Department of Main Roads Mackay district office.

Details should be provided of the impacts on environmental values of any new roads or road realignments. The EIS should include detailed analysis of probable impact of identified construction and operational traffic generated by the project with particular concern to impacts on road infrastructure, road users and road safety. Any potential road safety impacts from project lighting, such as effects on motorist's concentration while driving should be assessed and mitigated where necessary.

The EIS needs to indicate clearly the corrective measures necessary to address adverse road impacts and the costs involved. This will require the proponent to compare the traffic situation and road conditions with, and without, the project. The impact assessment should be based on a 10-year road design horizon until completion of the project. It should assess project impacts in terms of road safety and transport efficiency, focussing particularly on any accelerated reduction in pavement life and impacts on intersections. Any need for increased road maintenance or additional works should be identified. The EIS should also include a commitment by the proponent to funding mitigation measures that may be required as a result of the project, that are not already in the Main Roads Roads Implementation Program or in longer term planning.

The EIS should provide details of the impact on any current or proposed rail infrastructure, including track realignments and or closures of the Peak Downs Railway during construction of the proposed rail loop.

Provide information on product spill contingency plans and the adequacy of equipment and facilities to deal with possible spills for the transport nodes of the proposal. Indicate whether there is a need to update the plans based on increase in frequency of traffic and volumes to be transported.

The EIS should also address the potential impacts on privately owned or port authority operated ports and State-controlled, Commonwealth-controlled or privately owned airports.

### **4.11 Social**

#### **4.11.1 Description of environmental values**

This section describes the existing social values that may be affected by the proposal.

The amenity and use of the proposal area and adjacent areas for rural, agricultural, forestry, fishing, recreational, industrial, educational or residential purposes should be described. Consideration should be given to:

- Belyando and Nebo Shires' housing and accommodation availability, community infrastructure and services, access and mobility, taking into account the cumulative effects of a number of large mining projects on these services;
- population and demographics of the affected community;
- recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;
- health and educational facilities;
- farm activities near the proposed activities;
- number of properties directly affected by the project; and
- number of families directly affected by the project, this should include not only property owners but families of workers either living on the property or workers where the property is their primary employment.

#### **4.11.2 Potential impacts and mitigation measures**

The social impact assessment of the project should consider the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the project's impact, both beneficial and adverse, on the local community. The impacts of the project on local and regional residents, community services and recreational activities are to be analysed and discussed. The nature and extent of the community consultation program are to be described and a summary of the results incorporated in the EIS.

A baseline analysis of the existing housing market in the area should be conducted with emphasis on:

- the size of the private rental market in the area, including boarding houses, caravan parks, backpacker hostels, hotel and motel accommodation;
- the vacancy rate of rental accommodation, including assessment of seasonal fluctuations;
- median rents for the area;
- the availability and median cost of housing for purchase in the area;
- the level of social housing in the area, including rental housing administered by community housing organisations and public housing; and
- constraints and opportunities for new housing construction in the area, including the capacity of the local land development and housing construction industries to provide new housing.

Discuss any possible cumulative impacts on the local and regional housing market due to the presence of other existing or proposed major projects in the area, as well as possible cumulative impacts on housing demand due to seasonal employment factors (such as maintenance shutdowns). Consider the impact of the construction phase of the proposal on the local and regional residential development and housing construction industry, with particular reference to the demand and availability of accommodation for non-mining contractors.

The assessment of impacts should describe the likely response of affected communities.

Attention should be paid to:

- impacts on demographic, social, cultural and economic profiles;
- impacts on local residents, current land uses and existing lifestyles and enterprises;
- impacts on local and State labour markets, with regard to the source of the workforce. This information is to be presented according to occupational groupings of the workforce. The impacts of both construction and operational workforces and associated contractors on housing demand, community services and community cohesion is to be addressed. The capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the project is to be discussed;
- impacts of driver fatigue on workforce commuting long distances if local housing is unavailable;
- impacts of additional traffic on major roads within the project area;
- comment should be made on how much service revenue and work from the project (e.g. provisioning, catering and site maintenance) would be likely to flow to existing communities in the area of the project, particularly if a fly-in, fly-out workforce is proposed;
- impacts on local residents values and aspirations; and
- particular attention should be paid to the effects on –
  - the ability of both indigenous and non-indigenous people to live in accordance with their own values and priorities
  - the use of and access to culturally important areas and landscapes
  - the access to existing human and commercial services and housing
  - the ability to participate in regional and local employment and training opportunities and
  - the new project workforce and their families.

The potential environmental harm on the amenity of adjacent areas used for cropping, grazing, forestry, recreation, industry, education, aesthetics, or scientific or residential purposes should be discussed. The implications of the proposal for future developments in the local area including constraints on surrounding land uses should be described.

## **4.12 Health and safety**

### **4.12.1 Description of environmental values**

This section describes the existing community values for health and safety that may be affected by the proposal. Any impacts on the health and safety of the community, workforce, suppliers and other stakeholders should be detailed in terms of health, safety, quality of life from factors such as air emissions, odour, dust, noise, flooding, long shifts and long distance travel.

The EIS should include an assessment of the flood immunity of the transport infrastructure against the community infrastructure provisions of *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (SPP 1/03) for the purposes of the emergency access requirements of the Department of Emergency Services. Management strategies should be incorporated into the Environmental Management Plan in Section 5.

The EIS should demonstrate that workforce accommodation and fuel storage areas are located consistent with the requirements of SPP 1/03.

#### **4.12.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting or enhancing health and safety community values, describes how nominated quantitative standards and indicators may be achieved for social impacts management, and how the achievement of the objectives will be monitored, audited and managed.

The EIS should assess the effects on the project workforce of occupational health and safety risks and the impacts on the community in terms of health, safety, and quality of life from project operations and emissions.

Measures to control mosquito and biting midge breeding should be described.

Practical monitoring regimes should also be recommended in this section.

### **4.13 Economy**

#### **4.13.1 Description of environmental values**

This section describes the existing economic environment that may be affected by the proposal. The character and basis of the local and regional economies should be described including:

- existing housing market, particularly rental accommodation which may be available for the project workforce;
- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc.); and
- historical descriptions of large-scale resource developments and their effects in the region.

The economic impact statement should include estimates of the opportunity cost of the project and the value of ecosystem services provided by natural or modified ecosystems to be disturbed or removed during development.

#### **4.13.2 Potential impacts and mitigation measures**

The function of this section is to define and describe the objectives and practical measures for protecting or enhancing economic values, to describe how nominated quantitative standards and indicators may be achieved for economic management, and how the achievement of the objectives will be monitored, audited and managed.

The effect on local and State labour markets should be discussed with regard to the source of the workforce. This information should be presented according to occupational groupings of the workforce. In relation to the source of the workforce, clarification is required as to whether the proponent, or contractors, are likely to employ locally or through other means and whether there are initiatives for local employment opportunities. The impacts of both construction and operational workforces and associated contractors on housing demand should be addressed. The capability of the existing housing stock, particularly rental accommodation, to meet any additional demands created by the project should be discussed.

Any new skills and training to be introduced in relation to the project should be identified. Adequate provision should be made for apprenticeship and worker training schemes. If possible, the occupational skill groups required and potential skill shortages anticipated should be indicated.

An economic analysis, including a cost-benefit analysis, should be presented from national, state, regional and local perspectives as appropriate to the scale of the project. The general economic benefits from the project should be described.

The analysis is to include:

- the significance of this proposal on the local and regional economic context;
- the long and short-term beneficial (e.g. job creation) and adverse (e.g. competition with local small business) impacts that are likely to result from the development (including impact on the reliability and quality of water supply for downstream users);
- the potential, if any, for direct equity investment in the project by local businesses or communities;
- the cost to all levels of government of any additional infrastructure provision;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);
- the potential economic impact of any major hazard identified in Section 4.13;
- the distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

Consideration of the impacts of the project in relation to energy self-sufficiency, security of supply and balance of payments benefits may be discussed. Attention should be directed to the long and short-term effects of the project on the land-use of the surrounding area and existing industries, regional income and employment and the state economy. The scope of any studies should be referred to the government for input before undertaking the studies.

For identified impacts to economic values, suggest mitigatory and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies. Practical monitoring regimes should also be recommended.

## **4.14 Hazard and risk**

### **4.14.1 Description of environmental values**

This section describes the potential hazards and risk that may be associated with the proposal.

Detail the environmental values likely to be affected by any hazardous materials and actions incorporated in the proposal. The degree and sensitivity of risk should be detailed. The EIS should demonstrate that bunding of storage areas for fuels, oils and chemicals will meet the SPP 1/03 requirement that public safety and the

environment should not be adversely affected by the detrimental impacts of floodwaters on hazardous material manufactured or stored in bulk.

An analysis is to be conducted into the potential impacts of both natural and induced emergency situations and counter disaster and rescue procedures as a result of the proposal on sensitive areas and resources such as forests, water reserves, State and local government controlled roads, places of residence and work, and recreational areas.

#### **4.14.2 Potential impacts and mitigation measures**

This section defines and describes the objectives and practical measures for protecting people and places from hazards and risk, describes how nominated quantitative standards and indicators may be achieved for hazard and risk management, and how the achievement of the objectives will be monitored, audited and managed.

The EIS should provide an inventory for each class of substances listed in the Australian Dangerous Goods Codes to be held on-site. This information should be presented by classes and should contain:

- chemical name;
- concentration in raw material chemicals;
- concentration in operation storage tank;
- U.N. number;
- packaging group;
- correct shipping name; and
- maximum inventory of each substance.

Details should be provided of:

- safeguards proposed on the transport, storage, use, handling and on-site movement of the materials to be stored on-site;
- the capacity and standard of bunds to be provided around the storage tanks for classified dangerous goods and other goods likely to adversely impact upon the environment in the event of an accident; and
- the procedures to prevent spillages, and the emergency plans to manage hazardous situations.

The proponent should develop an integrated risk management plan and emergency response plan for the whole of the life of the project including construction, operation and decommissioning phases in consultation with the Department of Emergency Services. The emergency response plan should reflect the social, cultural, economic and natural aspects of the 'environment' as defined in the *Integrated Planning Act 1997*. The integrated risk management plan should include a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis (e.g. HAZOP Guidelines, NSW Department of Urban Affairs and Planning (DUAP)). The assessment should outline the implications for and the impact on the surrounding land uses, and should involve consultation with Department of Emergency Services, Queensland Fire and Rescue Authority, and Queensland Ambulance Service. The PHA should incorporate:

- all relevant major hazards both technological and natural;
- the possible frequency of potential hazards, accidents, spillages and abnormal events occurring;
- indication of cumulative risk levels to surrounding land uses;
- the life of any identified hazards;
- a list of all hazardous substances to be used, stored, processed, produced or transported;
- the rate of usage;
- description of processes, type of the machinery and equipment used;
- potential wildlife hazards such as crocodiles, snakes, and disease vectors; and
- public liability of the State for private infrastructure and visitors on public land.

The plan should include the following components:

- operational hazard analysis;
- regular hazard audits;
- fire safety, emergency;
- response plans;
- qualitative risk assessment; and
- construction safety.

Where relevant, each of these components should be prepared in accordance with the relevant NSW DUAP Hazardous Industry Planning Advisory Paper (HIPAP).

#### **4.15 Cross-reference with the terms of reference**

This section provides a cross reference of the findings of the relevant sections of the EIS, where the potential impacts and mitigation measures associated with the project are described, with the corresponding sections of the TOR.

## **5. Environmental management plan**

The Environmental Management Plan for a proposed mining project is an integral part of the EIS. It can be developed from the information in the EIS. Its purpose is to set out the proponents' commitments to environmental management, i.e. how environmental values will be protected and enhanced. Protection of environmental values will be achieved by preventing or minimising environmental harm in accordance with the commitments made in the text of the EIS. These commitments form the basis of conditions of the Environmental Authority.

## **6. References**

All references consulted should be presented in the EIS in a recognised format.



## **7. Recommended appendices**

### **A1. Final terms of reference for this EIS**

A copy of the final TOR should be included in the EIS.

### **A2. The standard criteria**

A brief summary of the proposal's compatibility with the standard criteria as defined by the EP Act should be presented. Each principle should be discussed and conclusions drawn as to how the proposal conforms. A life-of-project perspective should be shown.

### **A3. Study team**

The qualifications and experience of the study team and specialist sub-consultants and expert reviewers should be provided.

### **A4. Technical data**

Technical data used to support EIS analysis and support EIS outcomes should be provided in suitable detail and format.