Terms of Reference for the Goonyella Riverside Coal Mine Expansion Project

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

PROJECT BACKGROUND

Project Proponent

The proponent for the Goonyella Riverside Coal Mine Expansion Project is BM Alliance Coal Operations Pty Ltd (BMA). The Goonyella Riverside Coal Mine is owned by the Central Queensland Coal Associates Joint Venture.

Project Description

Goonyella Riverside Mine is the northernmost of the large open cut coal mines operated by BMA in the Bowen Basin. It is located in Belyando Shire, approximately 30km to the north of Moranbah and 190km south west of Mackay. The operational mining leases cover an area 22km long and 10km wide.

Goonyella mine commenced operations in 1971 and the Riverside mine commenced operations in 1983. In 1989 Goonyella merged operationally with Riverside mine and the combined operation became known as Goonyella Riverside Mine. An underground mine (Broadmeadow Mine) is currently being developed. It will contribute an additional 4 million tonnes per annum (Mtpa) to the 12 Mtpa capacity associated with the open cut operations. The mine competes in the medium volatile hard coking coal market.

The expansion project, which is the subject of the environmental impact statement (EIS), is to increase the annual coal production above 16 Mtpa. Options being considered provide for an increase in production to 20 Mtpa or 24 Mtpa through expansion of the open cut and underground operations. The expansion project may comprise the following components:

- Expansion of the existing open cut operations to the east and to the south-west;
- The storage of out-of-pit spoil to the east and west;
- Relocation of Red Hill Road and the diversion of Isaac River, Goonyella Creek, Fisher Creek and Platypus Creek;
- Expansion of the existing Broadmeadow underground mine in the Goonyella Middle Seam into the east;
- Establishment of an underground mine in the Goonyella Lower Seam; and
- Expansion of coal processing facilities, including upgrades to the existing coal processing plants and/or the construction of a third coal handling and processing plant.

The Goonyella Riverside Coal Mine Expansion Project is a controlled action (EPBC referral 2005/2248) under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions under Division 1 of Part 3 of the EPBC Act are: sections 18 and 18A (listed threatened species and communities) and sections 20 and 20A (listed migratory species). The State's environmental impact assessment (EIA) process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the bilateral Agreement between the Commonwealth of Australia and the State of Queensland (2004). Consequently, the State's process will be used to assess both State and Commonwealth matters.

Aims of the study

The objective of the EIA process is to ensure that all impacts, whether direct or indirect, and particularly environmental, social, and economic impacts are fully examined and addressed. Consistent with this objective, the EIS should be a self-contained and comprehensive document, which provides:

- for interested bodies and persons, a basis for understanding the project, alternatives and preferred solutions, the existing environmental values which it would affect, both on and off the site, and the impacts that may occur and the measures to be taken to mitigate all adverse impacts;
- for government agencies and referral bodies, a framework for assessing the impacts of the project and associated development in view of legislative and policy provisions; and
- for the proponents, a definitive statement of measures or actions to be undertaken to mitigate any adverse impacts during and following the implementation of the project. The recommended means of achieving this objective is the inclusion in the EIS of a draft environmental management plan that describes acceptable impacts and environmental management strategies to agreed performance criteria.

The key principle is that there should be sufficient detail presented in the EIS to enable readers to judge (assess) the impact of the project on environmental values. Readers are likely to include representatives of Commonwealth, State and local governments, special interest groups and the general public.

The environmental impact assessment process

The processes for EIA typically includes:

- an application stage, including an Initial Advice Statement or project description that involves consideration of triggers or criteria for EIA and the process that is most suitable for the project;
- development of Terms of Reference (ToR) or information requirements for an EIS or similar report, including public review of the draft ToR document;
- development and implementation of a consultation plan by the proponent;
- preparation of a draft EIS and EM Plan by the proponent;
- public review of the draft EIS and EM Plan;
- response by the proponent to stakeholder views usually in the form of a supplementary or additional report;
- draft and/or final assessment report by government that contains recommendations for the project; and
- further development of the EM Plan and other statutory requirements by the proponent as required (should the project proceed).

While every attempt has been made to ensure that these ToR address all of the major issues associated with this project, they are not necessarily exhaustive and should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them or matters (currently unforeseen) that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIS.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

CONTENT OF THE ENVIRONMENTAL IMPACT STATEMENT

Executive summary

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

Glossary of terms

A glossary of technical terms, acronyms and abbreviations should be provided.

1. Introduction

The function of the introduction is to explain the reasons 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 BM Alliance Coal Operations Pty Ltd who manage the mine on behalf of the Central Queensland Coal Associates Joint Venturers. Details should include postal address, contact details and information regarding the Joint Venture.

1.2 Project description

A brief description of the key elements of the project should be provided. Discuss how the elements relate to the existing Goonyella Riverside Coal Mine operations. Show the location of the project in its regional context on a map. This description should also include any major infrastructure requirements.

1.3 Project objectives and scope

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

This section should also describe how the project relates to any other actions or proposals that have publicly released information.

1.4 The environmental impact assessment process

The aim of this section is to clearly state and explain the objectives of the EIA process under the relevant legislation.

This section should include a description of the impact assessment process steps, timing and the decisions to be made for relevant stages of the project. This section should also outline mechanisms in the processes for public input and the public release of an EIS which will specify all responses to stakeholder submissions. The information in this section is required to ensure:

- All relevant legislation is addressed;
- There is awareness of the process to be followed; and
- Stakeholders are aware of opportunities for input and participation.

1.4.1 Objectives of the EIS

This section should provide a statement of the objectives of the EIA. The structure of the EIS should be outlined together with 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 direct and indirect effects of the project;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- to 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.

The role and purpose of the EIS should be outlined, and the audience able to distinguish the EIS as the key environmental document providing advice to decision makers considering approvals for the project. The role of the EIS in providing the project's environmental management plan (EM Plan) for ongoing regulation should also be discussed.

Discussion of options and alternatives and their likely relative environmental management outcomes is a key aspect of the EIS.

1.4.2 Submissions

Information should be provided on how submissions on the EIS will be addressed and taken into account during the decision making process.

1.5 Public consultation process.

An appropriate public consultation program, developed to the satisfaction of the Environmental Protection Agency (EPA), is essential to the full conduct of the impact assessment. Information about the consultation that has already taken place and the results of such consultation should be provided.

The public consultation program should provide ongoing 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 as required 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 *Environmental Protection Act1994*, *Mineral Resources Act 1989*, *Water Act 2000*, *Integrated Planning Act 1997*, *Aboriginal Cultural Heritage Act 2003*, *Transport Infrastructure Act 1994*, *Transport Operations (Road Use Management) Act 1995* and other relevant Queensland laws. Any requirements of the Commonwealth's EPBC Act should also be included.

This information is required to assess how the legislation applies to the project, which agencies have jurisdiction and whether the proposed EIS process is appropriate.

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 (as reflected in local and regional plans), and the 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.

Describe local government planning controls, State Planning Policies, local laws and policies applying to the development and provide a list of the approvals required for the project and the expected program for approval of applications. Particular consideration should be given to the Whitsunday Hinterland and Mackay Regional Plan.

This information is required to make clear how the project conforms to State, regional and local plans for the project area, particularly in relation to post-mining land use.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

1.7 Accredited process for controlled actions under Commonwealth legislation

This project has been determined to be a controlled action under the Commonwealth's EPBC Act. The Commonwealth has accredited the State's EIS process for the purposes of the Commonwealth's assessment under Part 8 of the EPBC Act.

As a minimum requirement, the EIS should provide separate discussions under sub-headings in the relevant sections that describe the values and address the potential impacts on relevant matters of national environmental significance (18 and 18A - threatened species and communities, and 20 and 20A - listed migratory species). The locations of those sub-headings should be readily identifiable from the Table of Contents. 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 the proposed action;
3) Description of the affected environment relevant to the controlling provisions;
4) Assessment of impacts on the matters of national environmental significance 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. The status of the project should be discussed in a regional, State and national context.

2.2 Alternatives to the project

This section should describe feasible alternatives, including conceptual, technological and locality alternatives to the project, and discuss 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 project, 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 environmental aspects, in particular the principles of sustainable development.

Comparative environmental impacts of each alternative should be summarised. The interdependencies of the project components should be explained, particularly in regard to how each of any industrial developments, or various combinations of industrial developments, and any infrastructure requirements relate to the viability of the project. The relationship of options chosen for waste management and any emissions produced should be detailed. This information is required to assess why the scope of the project is as it is and to ensure that the ESD principles and sustainable development aspects have been considered and incorporated during the scoping and planning of the project.

3. Description of the project

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

3.1 Location

The regional and local context of the project should be described and illustrated on maps at suitable scales. Maps should be provided showing the precise location of the project area, and in particular:

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- 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 (that is, private or State owned) of any new road and 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.

Real property descriptions of the project site should be included. 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.

Summarise the results of studies and surveys undertaken to identify the natural resources required to implement the project. The location, volume, tonnage and quality of natural resources required should be described (such as land, water, forests, energy, etc.).

An indication should be given if land acquisitions will be required, particularly for additional infrastructure. Discuss associated approvals required under the appropriate section of the EIS.

3.2 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 locations of the resources 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 of mine excavation(s);
- The location and boundaries of the plant site; and
- The location of local authority boundaries.

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

3.3 Construction

The extent and nature of the project's construction phase should be described. The description should include:

- type and methods of construction to be employed;
- construction timetable, including expected start-up dates, hours of operation and commissioning of plant dates;
- any staging of the project showing site boundaries, development sequencing and timeframes;
- construction equipment to be used;
- materials or plant to be transported onto the construction site, including hazardous materials;
- method of transport, routes and origin-destination information for plant and equipment;
- the extent of surface disturbance; and
- the estimated number of personnel to be employed during the construction phase with a description of where those people and their dependents will be accommodated and how they will be transported to site. Include an outline of recruitment schedules and policies for recruitment of workers (addressing recruitment of local and non-local workers). The information should show anticipated peaks in worker numbers during the construction period.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

3.4 Operations

3.4.1 Mining methods

The probable mining boundaries, mine path, mine development sequence and location of the spoil/overburden dumps, tailings/rejects dams, clean water dams and any final voids to be left at the cessation of mining should be described and illustrated on maps. The rationale for the preferred operational program should be explained.

The location and nature of the mining 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 the mining methods for open pit and/or underground mining;
- use of different techniques in areas of different topographic or geotechnical character;
- a description of plant and equipment to be used;
- the capacity of plant and equipment; and
- chemicals to be used.

Specific details should be provided of the proposed mine life.

Information should also be provided on the total workforce numbers to be employed in the project operations during its various stages, including decommissioning, 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).

3.4.2 Mine sequencing

Specific details, including maps and plans should be provided of the following:

- the quantity and location of coal to be mined at each stage of development and annually;
- 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;
- location and area of tailings and process water storages;
- the proposed progressive backfilling of excavations;
- the area disturbed at each major stage of the project; and
- staging of creek and infrastructure diversions.

3.4.3 Processing plant

The current and proposed processing plants should be illustrated on maps and described. The criteria for selecting the plant site should be described and the rationale for the preferred option should be explained.

The location and nature of the processes to be used should be described; including:

- a description of the 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 mine and processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams. A description should be provided of the quantities and characteristics of the products produced.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

3.4.4 Product 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 relevant coal terminals, even though the capacity to manage these impacts may fall beyond the scope of this project EIS.

3.4.5 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.

3.5 Infrastructure

This section should provide descriptions and layout plans of requirements for constructing, upgrading or relocating all infrastructures in the vicinity of the project area. The matters to be considered could include but not be limited to infrastructure such as roads, rail, bridges, tracks and pathways, dams and weirs, bore fields, power lines and other cables and pipelines for any services. More specific information is given below.

3.5.1 Transport – road/rail/ship

Describe the arrangements for the transport of plant, equipment, ore, products, wastes and personnel during the construction phase, operational phase and decommissioning phase 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. The traffic impacts shall be addressed in detail under Section 4.

Specific information to be provided includes:

- expected volumes of plant, equipment, ore, products, wastes, hazardous materials and personnel to be transported and each method/type of transport to be used;
- increase in number of services/vehicles required over existing numbers;
- anticipated times and frequency at which movement may occur;
- details of any transport of heavy or oversize loads;
- proposed transport routes;
- need for increased road and rail maintenance and upgrading; and
- internal transport methods to be used to carry material from new excavation areas to the processing plant and rail loading facilities.

Detail the increase in shipping movements as a result of the project, including required timing of increased loading and shipping capacity.

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 project. The locations of any easements for energy supply should be shown on the infrastructure plan.

3.5.3 Water supply and storage

The EIS should provide information on the water usage for the project, including the quality and quantity of water supplied to each use on the site. Include a discussion of all potential sources of water for each use (sources can include bores, mine water, surface storages and municipal supplies as well as alternative sources such as sewage and other wastewaters generate on-site and off-site). Details should be provided on the amount

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

of water reused or recycled and how the discharge of wastewater will be avoided or minimised, including any treatment undertaken. Any proposed water conservation and management measures should be described.

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

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.

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. If discharging into an existing sewerage system, provide an assessment of the capacity of the existing system to accept the effluent.

3.5.6 Accommodation and other infrastructure

Provide a description 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 estimated construction and operations workforce that addresses the estimated housing needs of both single and accompanied 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

Provide an inventory of all wastes generated by the project through construction, mining and production processes. 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 ore processed;
- the amount of resulting process wastes;
- the tonnage and volume of waste rock removed to extract the mineral; and
- the volume and tonnage of any by-products left from the processing of the mineral.

Determine the physical and chemical characteristics of waste material from the mine and process plant. This should include details of methodology and results of waste rock characterisation that includes the potential quantity, variability and net acid producing potential of the mined waste rock and processed waste rock materials through static testing (metals analysis, sulphides, pH, conductivity, Net Acid Generation (NAG) and Acid Neutralising Capacity (ANC), etc), and tests that show likely outcomes under field conditions, such as kinetic testing where waste rocks are likely to generate acid. Sampling should be representative with profiles of all geological units included and based on accepted statistical procedures.

Having regard for best practice waste management strategies and the *Environmental Protection (Waste Management) Policy 2000*, the proposals for waste avoidance, reuse, recycling, treatment and disposal should

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

be described in the appropriate sub-section below. Information should also be provided on the variability, composition and generation rates of all waste produced 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 minimizing environmental impacts at each stage of the project. Details on natural resource use efficiency (for example, 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.

3.6.1 Solid waste

Describe the proposed location, site suitability, dimensions and volume of dumps (overburden, waste rock and tailings), including their method of construction. Methods to prevent acid formation, seepage and contamination should be given. Describe measures to ensure stability of the dumps and impoundments. Dump design aspects that are supportive of sustainable post mine land uses should be described.

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

3.6.2 Liquid waste

Describe the origin, quality and quantity of waste water and liquid waste originating from the project. Particular attention should be paid to the capacity of wastes to generate acid, saline or sodic waste water. A water balance for the mining project and processing plant is required to account for the estimated usage of water. The EIS should consider the following effects:

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

Detail how wastewater discharges are avoided, minimised, recycled and treated as much as practicable as required under section 15 of the *Environmental Protection (Water) Policy 1997*.

Provide details of likely leachate quality from waste rock and tailings expected under field conditions, including contaminants such as sulphate, pH, chloride, iron and other non-metallic and metallic ions.

3.6.3 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. Estimation of emission rates may be based on actual measurements from the existing Goonyella Riverside Mine. 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 (for example, trucks, either by entrainment from the load or by passage on unsealed roads).

3.7 Rehabilitation and decommissioning

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the project, including the use of threatened plant species during revegetation with the

goal of achieving a nil loss of conservation value. The rehabilitation strategies and methods should have the following objectives:

- Mining and rehabilitation should aim to create a stable 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.

As a minimum requirement, the strategies and methods presented for progressive and final rehabilitation of disturbed areas must 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)*.

A preferred rehabilitation strategy should be described with a view to minimising the amount of disturbed land 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.

Describe the means of decommissioning the project, in terms of the removal of plant, equipment, structures and buildings, and the methods proposed for the stabilisation of the affected areas. 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.

Provide details of proposals to divert creeks during operations, and, if applicable, for the reinstatement of the creeks after operations have ceased. Where dams are to be constructed, proposals for the management 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.

The choice of post mining land use/s should be justified in the context of likely post mine land ownership and acceptable post mine management and maintenance liability. Implications for the long-term use and fate of the site should be addressed, particularly with regard to the on-site disposal of waste, post mine land management and maintenance liability, public safety and the site's inclusion on the Environmental Management Register or Contaminated Land Register.

3.8 Financial feasibility

This section shall detail the financial feasibility of the project, 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.

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 Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- **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 infrastructure characteristics such as width or 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 project on the identified environmental values of the area. The cumulative impacts of the project must be considered over time or in combination with other impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of the 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, accommodation, social amenities 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 project and other proposals competing for use of the local air and water sheds. Consultative arrangements with other industries in the project 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 road use 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;
- **management and review strategies** – describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented, for example, 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 (such as 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 EM Plan for the project.

4.1 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 (such as temperature inversions) that may affect air quality within the region of the project. Extremes of climate (droughts, floods, cyclones, etc) should also be discussed with particular reference to water management at the project 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.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

The potential impacts due to climatic factors should be addressed in the relevant sections of the EIS. For example, the impacts of rainfall on soil erosion should be addressed in section 4.2. The impacts of storm events on the capacity of waste containment systems (that is, site bunding/stormwater management and tailings dams) should be addressed in section 4.4 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 4.5.

4.2 Land

4.2.1 Description of environmental values

This section describes the existing environment values of the land area that may be affected by the project. 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.

4.2.1.1 Environmentally sensitive areas

The EIS should identify whether areas that are environmentally sensitive could be affected, directly and indirectly, by the project. Areas sensitive to environmental harm caused by the project can be determined through site-specific EIA processes. In particular, the EIS should indicate if the land affected by the project 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, 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 (such as Ramsar, JAMBA, CAMBA), areas of cultural significance and scientific reserves. In addition the EPBC Act should be addressed and whether there are national environmentally significant matters that should be described. The proximity of the project activities to any of these areas should be identified. Maps should identify areas of conservation value in any locality that may be impacted by the project. See section 4.8.1 for further guidance on sensitive areas.

4.2.1.2 Topography and geomorphology

Maps should be provided locating the project in both regional and local contexts. The topography of the project 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.

4.2.1.3 Geology

The EIS should provide a description, map and a series of cross-sections of the geology of the project areas, 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, geological faults and associated geological hazards), rehabilitation programs, or the quality of wastewater leaving any area disturbed by the project should be described. In locations where the age and type of geology is such that significant fossil specimens may be uncovered during construction/operations, the EIS should address the potential for significant finds.

4.2.1.4 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, 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 mineral resources 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) 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) as appropriate.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

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/overburden 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.

4.2.1.5 Soils

A soil survey of the sites affected by the project 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 (such as 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. Areas to be disturbed should be mapped more intensively than non-disturbed areas.

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*.

4.2.1.6 Land use

The EIS should provide a description of current land tenures and land uses, including native title issues, in the project 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.

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. Indicate locations of gas and water pipelines, power lines and any other easements. Describe the environmental values affected by this infrastructure.

Maps at suitable scales showing current land uses and tenures, and the project location, should be provided for the entire project area and surrounding land that could be affected by the development. 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 covering all proposed disturbed and undisturbed areas within the project mining lease areas should be provided in terms of the physical and economic attributes. 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 classifications system can be found in Attachment 2 of *Land Suitability Assessment Techniques* of the *Technical Guidelines for Environmental Management of Exploration and Mining in Queensland*, (Queensland Department of Mines and Energy, 1995). Use the information from the assessment to produce a land suitability map of the proposed and adjacent area, and setting out land suitability and current land uses, such as for grazing of native and improved pastures and horticulture.

4.2.2 Potential impacts and mitigation measures

This section defines and describes the objectives and practical measures for protecting or enhancing the environmental values identified through the studies outlined in the previous section. It should describe how

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

4.2.2.1 Resource utilisation

The EIS should analyse the effectiveness of the mining project 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 project 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.

4.2.2.2 Land use suitability

Describe the potential for the construction and operation of the project to change existing and potential land uses of the project site and adjacent areas. Post mining land use options should be detailed, including suitability of the area mined 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 community acceptance and economic viability, optimising the long term stability of the site and minimising potential liabilities for long term management and public safety risk. Discuss ongoing land management requirements associated with the preferred post mining land use.

The potential environmental harm caused by the project on the adjacent areas currently used for agriculture, urban development, recreation, tourism, other business and the implications of the project for future developments in the impact area including constraints on surrounding land uses should be described.

If the development adjoins or potentially impacts on good quality agricultural land or residential land, then an assessment of the potential for land use conflict is required. Investigations should follow the procedures set out in the planning guidelines *Separating Agricultural and Residential Land Uses* (DRM, DLGP, 1997) and/or *The Identification of Good Agricultural Land* (DPI, DHLGP, 1993).

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, and nominate measures to avoid the unacceptable impacts defined.

4.2.2.3 Land disturbance and soil erosion

Provide details of areas to be disturbed as a result of the project activities, discussing the different types of disturbance proposed. Maps should be provided of these areas showing disturbance in stages over the project life.

Describe current erosion rates and use these to estimate the likely erosion to occur as a result of the project. Where no baseline monitoring has been undertaken, an estimate based on modelling should be used.

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;
- voids;
- any overburden dumps;
- tailings/reject disposal areas;
- 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; (b) preventing any material degradation of local waterways by suspended solids and turbidity; and (c) minimising wind generated dust. Methods used and

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

release limits for suspended solids must be based on implementation of best practice erosion and sediment control guidelines, for example, *Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites* (Institute of Engineers, Queensland Division).

Nominate objectives, standards and indicators (success criteria) applicable to soil erosion from the project such as acceptable soil loss rates. An erosion monitoring program, including rehabilitation measures for erosion problems identified during monitoring, should also be outlined.

4.2.2.4 Land contamination

The EIS should describe the possible contamination of land from aspects of the project 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 *Environmental Protection Act 1994*) should be addressed. Methods proposed for 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 project 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* 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 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.

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: http://www.epa.qld.gov.au/ecoaccess/contaminated_land/. Proponents should refer study proposals to the contaminated land section within the EPA for review prior to commencement.

4.2.2.5 Rehabilitation and decommissioning

A rehabilitation 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 rehabilitation should be described.

The methods for progressive and final rehabilitation of the areas disturbed by the mining activities should be described in the context of the expected final landforms, self-sustaining vegetation cover, sustainability criteria, and land suitability for nominated final land uses. Methods discussed should include but not be limited to:

- backfilling of voids;
- landform design to ensure geotechnical and hydrological landform stability and aesthetics;
- selective material handling and encapsulation of acid generating materials;
- consolidation and re-contouring of overburden dumps and tailings dams;
- topsoil management such as transport, storage, and replacement on disturbed areas;
- revegetation and landscaping including consideration of the use of threatened plant species;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- erosion and sediment control; and/or
- fencing.

Rehabilitation of any voids remaining after mining should be described in detail including post-mining land use, void water quality, suitability for use by stock, safety of access, maintenance requirements, and stability of void walls. Voids should be, where possible, backfilled.

Rehabilitation of any tailings dams should be described in detail, including consolidation, capping, revegetation, fencing, and monitoring.

Proposals to divert creeks during mining, and, if applicable, for the reinstatement of the creeks after mining has ceased, should be provided. Where dams are to be constructed, proposals for the management of these structures after the completion of the project should be given.

Provide information regarding decommissioning and rehabilitation of the plant site, removal of processing plant and other equipment, rehabilitation of concrete footings and foundations, hard stand areas, storage tanks including any potential for reuse of these facilities. The methods proposed for the stabilisation of the affected plant areas should be given. Final rehabilitation of the plant site should be discussed in terms of ongoing land use suitability, stability, sustainability and management of any residual contaminated land and other land management issues.

A contour map of the lease area after the proposed mining operation is completed should be provided showing the final topography of all areas disturbed. Also, the final drainage and seepage control systems and long term monitoring plans should be described. Discuss how settling or subsidence of rehabilitated areas may affect the use of the land in its agreed post mine form.

Nominate standards and indicators (success criteria) applicable to land disturbance from the project and the subsequent rehabilitation strategy. This may include but not be limited to such criteria as:

- Geotechnical and hydrological landform stability:
  - landform designs in accordance with the agreed design criteria such as maximum heights, maximum depths of voids;
  - encapsulation configuration for selective material handling;
  - no mass failure of slopes;
  - stable final void highwalls;
  - drainage structures (drains and diversions) with similar erosional characteristics as natural waterways in the vicinity of the site (that is, an analogue drainage system);
  - soil erosion reducing and stabilising; and
  - downstream water quality complying with conditions of the environmental authority (sediment and salinity values).
- Soil profile:
  - topsoil depth;
  - growth media depth;
  - physical and chemical property limits;
  - organic matter;
  - soil nutrients; and
  - invertebrate activity.

A monitoring program should be proposed. Nominate one or more analogue sites for monitoring and comparison purposes. Success criteria for the establishment of self-sustaining vegetation should be provided in section 4.8.2.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

4.3 Scenic values

4.3.1 Description of environmental values

An assessment is to be made of the existing visual quality/landscape character of the project site and the surrounding area and it's prominence including local, regional, State-wide, national and international significance. Information in the form of maps, sections, elevations and photographs is to be utilised, particularly addressing the following:

- major views, view sheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences in the affected area;
- focal points, landmarks (built form or topography), gateways associated with the project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site;
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;
- identification of the areas of the project that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and
- the value of existing vegetation as a visual screen.

4.3.2 Potential impacts and mitigation measures

The visual impact, in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation and other known vantage points day and night, during all stages of the project as it relates to the surrounding landscape is to be analysed and discussed. The assessment is to address the local and broader visual impacts of the project structures and associated infrastructure, using appropriate simulation. Sketches, diagrams, computer imaging and photos are to be used where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations. Special consideration is to be given to public roads, public thoroughfares, and places of residence or work which are within the line-of-sight of the project.

An assessment of all potential impacts of lighting of the project, during all stages, is to be provided, with particular reference to objectives to be achieved and management methods to be implemented to mitigate or avoid:

- the visual impact at night;
- night operations/maintenance and effects of lighting on fauna and residents;
- the potential impact of increased vehicular traffic; and
- changed habitat conditions for nocturnal fauna and associated impacts.

Describe how the impacts of the project on the visual quality and landscape character of the site and the surrounding area are to be mitigated or avoided. Particular reference should be made to the following:

- impacts on existing land use that contribute to the character of the local area;
- potential impacts to scenic amenity of any conservation area; and
- the visual absorption capacity of the site - it's ability to absorb the impact of the proposed development.

4.4 Water resources

4.4.1 Description of environmental values

The function of this section is to describe the existing environment for water resources which may be affected by the project in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

4.4.1.1 Surface waterways

Describe and provide a map/plan identifying the surface water courses in the area affected by the project together 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 and flows in major streams and wetlands.

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

- values identified in the *Environmental Protection (Water) Policy 1997*;
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form;
- any water resource plans, land and water management plans relevant to the affected catchment;
- any lakes and springs as described in the dictionary of the Regional Vegetation Management Codes; and
- integrated assessment of waterway condition including stream habitat health, and other ecological indicators such as biodiversity.

Rainfall patterns including magnitude and seasonal variability of rainfall must be considered. Extremes of climate (droughts, floods, etc) should also be discussed with particular reference to water management at the project site. The vulnerability of the area to natural or induced hazards, such as floods, should also be addressed. The relative frequency, magnitude and risk of these events should be considered. 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 project. Flood studies should include a range of annual exceedance probabilities for affected waterways, where data permits.

Provide a description, with photographic evidence, of the geomorphic condition of any watercourses likely to be affected by disturbance or stream diversion. The results of this description should form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the project.

An assessment is required of existing water quality in surface waters and wetlands likely to be affected by the project. The basis for this assessment should be a monitoring program, with sampling stations located upstream and downstream of the mining project. Complementary stream-flow data should also be obtained from historical records (if available) to aid in interpretation. The waterways monitoring program should be designed to assist in the development of Water Quality Objectives for any waterways potentially affected by the project. Where appropriate any potential “reference sites” should be identified and assessed accordingly.

The existing water quality should be described in detail to gain a current assessment of seasonal variations, variations due to rainfall (such as, drought conditions), and variations within and between flow events. The methodology of sampling or monitoring undertaken to determine this information should be explained.

4.4.1.2 Groundwater

Describe the environmental values of the underground waters of the affected area in terms of:

- values identified in the Environmental Protection (Water) Policy 1997;
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of groundwater resources.

The EIS should review the quality, quantity and significance of groundwater in the project area, together with groundwater use in neighbouring areas, including that from the existing mining operations.

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;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- pumping parameters (where such information exists);
- draw down and recharge at normal pumping rates (where such information exists); 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 the project 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;
  - Depth to and thickness of the aquifers; and
- 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 zones of potential discharge;
  - Vulnerability to pollution.

An assessment of the groundwater quality should be sufficient to enable identification of the major ionic species present in the groundwater, pH, electrical conductivity and total dissolved solids.

4.4.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives 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.

The EIS should describe the possible environmental harm caused by the project to environmental values for water as expressed in the *Environmental Protection (Water) Policy 1997*. Water management controls should be described, addressing potential impacts on 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 project.

Key water management strategy objectives include:

- protection of important local aquifers and protection of their waters,
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota and the littoral zone), and
- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the project.

Conduct a risk assessment for uncontrolled emissions to water due to system or catastrophic failure, determine implications of such emissions for human health and natural ecosystems, and list strategies to prevent, minimise and contain impacts.

4.4.2.1 Surface waters and water courses

The potential changes to the flow and the quality of surface waters from all phases of the project 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. The quantity of water to be discharged from the site during construction, operations and decommissioning, and the different sources of the water should be described.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

The hydrological impacts of the project should be assessed, particularly with regard to stream diversions, scouring and erosion impacts on the flood plain, and changes to flooding levels and frequencies both upstream and downstream of the project. Modelling of afflux should be provided and illustrated where appropriate.

Discuss any proposed stream diversions, causeway construction and crossing facilities, stockpiled material and any other impediments (temporary or permanent) required for construction or operational/maintenance purposes that will restrict fish passage (short or long term).

Quality characteristics discussed should be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any water discharged from the site (including concentrations of constituents) at the point of entering natural surface waters should be discussed in reference to the *Draft Queensland Water Quality Guidelines 2005*, along with toxicity of effluent constituents to flora and fauna. 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* also should be used as a reference for evaluating the effects of various levels of contamination.

Reference should be made to the technology for settling suspended solids from discharge water.

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. Options to minimise these impacts should be proposed and an appropriate monitoring strategy described.

Identify where a licence or permit will be required under the *Water Act 2000* to take or interfere with the flow of water and provide details of the proposal. Where approvals are required for the diversion of a watercourse, these may be dealt with under the provision of the *Water Act 2000, Environmental Protection Act 1994* and the *Integrated Planning Act 1997*. Details of these proposals should be provided.

Methods for mitigation of potential impacts and the effectiveness of mitigation measures should be discussed with particular reference to sediment, acidity, salinity and other emissions of a hazardous or toxic nature to human health, flora or fauna. Propose monitoring programs which should include additional indicators of waterway health as necessary to provide an integrated assessment of waterway condition, that is, indicators of stream habitat (for example riparian vegetation, stream morphology) and ecological indicators (such as biodiversity) in addition to physical-chemical indicators of in-stream water quality.

Where it is proposed that creeks will be diverted or subsided, the EIS should detail how rehabilitation will affect both the physical and ecological condition of the creek's bed and banks, the fluvial processes and the quality of water in it. Furthermore, the EIS should describe the monitoring that will be undertaken after decommissioning, and who will have responsibility for management measures and corrective action, to ensure that rehabilitated creeks do not degrade.

4.4.2.2 Groundwater

The EIS should include an assessment of the potential environmental harm to the local groundwater resource, including its water quality. An assessment should be undertaken of the impact of the project on the local ground water regime caused by the altered porosity and permeability of any land disturbance. An assessment of the potential to contaminate groundwater resources and measures to prevent, mitigate and remediate such contamination should be discussed.

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 project 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 project should be described.

Key water management strategy objectives should include the protection of important local aquifers and protection of their waters. Where surface waters are shown to be groundwater dependent, the maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

(including maintenance of in-stream biota and the littoral zone) should also be considered. Water management controls should be described, addressing groundwater quality and quantity, taking into account the existing and expected groundwater flow direction. 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 project.

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.

4.4.2.3 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 (including waste rock) to generate acid, and saline or sodic waste water, or contaminants such as sediment, metals and other potentially toxic chemicals. The EIS should consider the following effects:

- groundwater from excavations (open cut/underground);
- 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* and the *Draft Queensland Water Quality Guidelines 2005*, 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

4.5 Air

4.5.1 Description of environmental values

This section describes the existing air environment, which may be affected by the project in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

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 project should be discussed. Analyse the dust deposition gauges data collected from the existing mining site and compare the results with the best practice national/international standards.

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 impacts within the air shed. The EIS should describe the air temperatures, humidity, wind (direction and speed), atmospheric stability, mixing depth and any other special factors (such as temperature inversions) likely to affect air quality within the environs of the mining project and those necessary for input to the models.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

4.5.2 Potential impacts and mitigation measures

The purpose of this section is to define and describe 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 likely 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.

Results of the dispersion modelling must be presented as concentration contour plots and frequency contour plots indicating likely ground level concentration (GLC) at the nearest sensitive receptor(s) for maximum (99.9 percentile) and 99.5 percentile values. The averaging period for ground level concentrations of the pollutants that are modelled should be consistent with the relevant averaging periods for air quality indicators and goals in the *Environmental Protection Policy (Air) 1997* and the National Environmental Protection Measure (NEPM) Air. For example, the modelling of suspended particulates and PM10 must be conducted for 24-hours and annual averaging periods.

Undertake an impact assessment with relevant inputs of emissions and local meteorology to the air dispersion model to provide estimates of the likely impacts on the surrounding environment. The model inputs should be as detailed as possible, reflecting any variation of emissions with time and including at least a full year of representative hourly meteorological data.

Estimate the proposed level of dust emissions and its impact on the receiving environment during the progress of the mining period and identify the worst-case potential impact.

The potential for interaction between any emissions from the coal processing plant, and emissions in the air shed, and the likely environmental harm from any such interaction, should also be detailed.

The predictions of average ground level concentrations should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions should be identified and modelled where necessary. The techniques used to obtain the predictions should be referenced, and key assumptions and data sets explained. The assessment of the project's impact, that is, environmental harm, on air quality should consider the following matters:

- features of the project 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 (1998), the National Health Medical Research Council (NHMRC) *National Guidelines for Control of Emissions from Stationary Sources 1985*, and the *Environmental Protection (Air) Policy 1997*; and
- air shed management and the contribution of the project to air shed capacity in view of existing and future users of the air shed for assimilation and dispersion of emissions.

Describe the methods that will be employed for the mitigation of impacts from air emissions. Also, discuss the back up measures to be incorporated that will act in the event of failure of primary measures to minimise the likelihood of plant upsets and adverse air impacts.

4.5.2.1 Greenhouse gas abatement

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

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- an inventory of proposed future annual emissions for each greenhouse gas and total emissions expressed in 'CO_2 equivalent' terms for each component of the project and for the combined total project;
- the intended measures to avoid and minimise greenhouse emissions;
- methodologies by which estimates were made; 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 Waste

4.6.1 Description of environmental values

The function of this section is to describe the existing environmental values that may be affected by wastes from project activities in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

4.6.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes, to describe 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.

The EIS must be clear as to whether the impacts and mitigation measures associated with the spoil/overburden dumps and the tailings/rejects from the coal handling and preparation plants, will be discussed in this section or elsewhere within the EIS.

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 overburden dumps and impoundments;
- methods to prevent seepage and contamination of groundwater and surface waters from stockpiles and/or dumps;
- market demand for recyclable waste (where appropriate);
- waste minimisation techniques processes proposed; and
- decommissioning of the site.

Having regard for the *Environmental Protection (Waste Management) Policy 2000*, the EIS should indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all phases of the project. The EPA has also released draft guidelines covering aspects of waste management under this EPP, which should be addressed.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Waste minimisation and treatment, and also the application of cleaner production techniques, should also be applied to gaseous wastes, particularly nitrogen oxides, sulfur oxides, particulates and carbon dioxide where relevant.

Particular attention should be paid to measures, which will maximize energy efficiency and minimize internal energy consumption in the project.

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 project. Details on natural resource use efficiency (such as energy and water), integrated processing design, co-generation of power and by-product reuse as shown in a material/energy flow analysis are required.

4.7 Noise and vibration

4.7.1 Description of environmental values

This section describes the existing environmental values that may be affected by noise and vibration from the project in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

If the proposed activities could adversely impact on the noise environment, baseline monitoring should be undertaken at a selection of sensitive sites affected by the project. 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 background noise level should be determined for those areas beyond the boundaries of the project where noise emissions resulting from the carrying out of activities may cause an environmental nuisance at any noise sensitive place and/or commercial place. Measurement of background noise level should be in terms of at least statistical noise descriptors L_{A10}, L_{A90} and the equivalent sound pressure level, L_{Aeq}.

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 day and night when the activities are likely to be carried out. Monitoring methods should adhere to relevant EPA guidelines and Australian Standards, and any relevant requirements of the *Environmental Protection (Noise) Policy 1997*.

4.7.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing environmental values from impacts by noise and vibration, to describe 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 (noise contours, modelling results) should be submitted on the proposed generation of noise from the project activities. 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 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 harm, including environmental nuisance from noise.

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.

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 places of work or residence, recreation, worship and general amenity. The magnitude, duration and frequency of any vibration should be discussed. Measures to prevent or minimise environmental harm, including nuisance, should be discussed.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Reference should also be made to the *EPA Guidelines: Noise and vibration from blasting* and *Planning for Noise Control*. The assessment should also address off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the project.

4.8 Nature conservation

4.8.1 Description of environmental values

This section describes the existing environmental values for nature conservation that may be affected by the project activities in the context of environmental values as defined by the *Environmental Protection Act 1994*, Environmental Protection Policies, the *Nature Conservation Act 1992* and the EPBC Act.

The environmental values of nature conservation for the affected area should be described in terms of:

- 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 (including springs and associated vegetation).

Any areas of wetlands (as listed in the *Directory of Important Wetlands in Australia*, Environment Australia 2001), lakes or springs (as listed in Fensham and Fairfax, 2002, *Queensland Springs – distribution and assessment*) should be identified and vegetation associated with these described under this section.

Discuss the nature conservation values of the areas likely to be affected by the project. 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 flora and fauna communities which are rare or threatened, environmentally sensitive localities including waterways, riparian zones and habitat corridors should be described. Further detail is given in the subsections below.

The EIS should identify issues relevant to sensitive areas, or areas which may have low resilience to environmental change. Project proximity to any biologically sensitive areas should be described. Areas which would be regarded as sensitive with regard to flora and fauna have one or more of the following features (and these should be identified, mapped, avoided or effects minimised):

- important 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 EPA 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 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; and/or

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

  - 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* 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*.

The Queensland *Vegetation Management Act 1999* and the findings of any regional vegetation management plan should be referenced. The occurrence of pest species in the project area should be highlighted. Key flora and fauna indicators should be identified for future ongoing monitoring.

4.8.1.1 Terrestrial flora

Describe the existing terrestrial and riparian vegetation cover of affected areas. 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 location of any horticultural crops in the vicinity of the site should be shown. Discuss the existence of local and regional weed species.

Vegetation mapping for all relevant project sites should be included. Adjacent areas may also require mapping. Describe the terrestrial vegetation communities within the affected areas at an appropriate scale with mapping produced from aerial photographs and ground truthing, showing the following:

- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (National Parks, Conservation Parks, Resource Reserves, Nature Refuges);
- 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 2nd edition) and the EPA's website listing the biodiversity status of regional ecosystems;
- location of vegetation types of biodiversity significance based on EPA's Biodiversity Planning Assessment 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; 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 recorded in a form compatible with the Queensland Herbarium CORVEG database;
- a minimum site size of 10 by 50 metres;
- a complete list of species present at each site recorded;
- the relative abundance of plant species and their assemblage recorded;
- assessment of the significance of any plant species to conservation, scientific, educational, historical, cultural, commercial or recreational interests; and

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- specimens of species listed as Protected Plants under the *Nature Conservation (Wildlife) Regulation 1994*, other than common species, submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

Flora surveys should be conducted under the necessary EPA Scientific Purposes Permit issued under the *Nature Conservation (Wildlife) Regulation 1994*. The description should contain a review of published information and existing information on plant species may be used in addition to new survey work.

4.8.1.2 Terrestrial fauna

Describe the terrestrial and riparian fauna occurring in the areas affected by the project, noting the broad distribution patterns in relation to vegetation, topography and substrate. Fauna surveys should be conducted both day and night where applicable and throughout the year 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. Fauna surveys should be conducted under the necessary EPA Scientific Purposes Permit issued under the *Nature Conservation (Wildlife) Regulation 1994*. Methodology employed for fauna surveys must adhere to conditions outlined in the Scientific Purposes Permit.

Methodology employed for fauna surveys should be in keeping with standard methodology as set out in the *Systematic Vertebrate Fauna Survey in the Southeast Queensland Bioregion* (Qld Department of Environment, 1997)

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

- species diversity (that is, a species list) and abundance of animals, including amphibians, fish, 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 (for example, 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 project occurs.

4.8.1.3 Aquatic biology

Describe the aquatic flora and fauna occurring in the areas affected by the project, 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.

4.8.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing nature conservation environmental values, to describe 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.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Describe the potential environmental harm to the ecological values of the area affected arising from the construction, operation and decommissioning of the project including clearing, salvaging or removal of vegetation, and the indirect effects on vegetation not cleared. Short term and long term durations should be considered and whether the effects are reversible or irreversible. The discussion should cover all likely direct and indirect environmental harm on flora and fauna particularly sensitive areas as listed previously. Terrestrial and aquatic environments should be covered, including human originated impacts and the control of any domestic animals introduced to the area.

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. Describe measures to mitigate the environmental harm to habitat (such as loss of dead trees and deep litter layer) or the inhibition of normal movement, propagation or feeding patterns, and change to food chains.

Strategies for protecting relevant World Heritage properties, and any rare or threatened species should be described, and any obligations imposed by State or Commonwealth endangered species legislation or policy or international treaty obligations (such as JAMBA, CAMBA) should be discussed.

Mitigation measures and/or offsets should be proposed for adverse impacts. Any departure from no net loss of ecological values should be described. Measures proposed should include the re-establishment of regional ecosystems including the use of local provenance native species. The rehabilitation of disturbed areas, provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory, nomadic and aquatic animals should be discussed. Rehabilitation of disturbed areas should incorporate where appropriate provision of nest hollows and ground litter.

Discuss weed control strategies aimed at containing existing weed species (such as Parthenium and other noxious weeds) and ensuring no new invasive weeds are introduced to the area. Feral animal management strategies should be prepared. The study should develop strategies to ensure that the project does not contribute to increased encroachment of any feral animal species. Reference should be made to any local government authority pest management plan when determining control strategies. Weed control and feral animal management strategies also should be provided as part of the overall EM Plan for the project.

Indicators and standards for nature conservation management and rehabilitation success criteria should be nominated in the EIS. Further studies during the mine life may be undertaken to confirm the applicability of the nominated success criteria. For example, success criteria for self-sustaining vegetation should include the following and be reiterated as conditions in the EM Plan:

- species composition and diversity (minimum percentage of key species);
- projective cover (percentage);
- weed presence (percentage);
- type of ecosystem;
- folio nitrogen and phosphorus; and
- ecosystem function analysis based on (a) landform function analysis (soil stability, infiltration capacity, nutrient recycling); (b) key species recruitment; (c) habitat complexity; (d) vegetation dynamics, and (e) successional change.

Analogue sites for monitoring and comparison should be identified. A monitoring program for the nature conservation management and rehabilitation success criteria should be proposed. Consider the timing of the monitoring, both at establishment and when it is considered maintenance can cease.

Consideration should be given to securing other areas of endangered ecosystems of State and regional significance if disturbed regional ecosystems cannot be re-established.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

4.9 Cultural heritage

4.9.1 Aboriginal cultural heritage values and management of impacts

The proponent is required to develop and have approved, a cultural heritage management plan under Part 7 of the *Aboriginal Cultural Heritage Act 2003*.

The Department of Natural Resources and Mines should be consulted for the provision of general advice including the appropriate conduct of cultural heritage surveys.

4.9.2 Non-Indigenous cultural heritage values and management of impacts

A cultural heritage study is required to be undertaken to describe non-indigenous cultural heritage sites and places, and their values. The study should include a comprehensive field study to identify non-Indigenous cultural heritage features including potential archaeological deposits.

It should be noted that under the *Queensland Heritage Act 1992* Part 7: Discovery and Protection of Objects and Areas section 44, it is a requirement that approval for the study must be obtained prior to the commencement of the study.

The study should include but not be limited to the following:

- literature search of historical documentation for the relevant area;
- comprehensive survey of the proposed development site;
- record and map in detail of all non-Indigenous cultural heritage features including potential archaeological deposits;
- map and record all features and their relationship to the proposed development;
- describe all direct and indirect impacts that may affect the identified features;
- undertake consultation with the community;
- assess each of the identified features as to cultural heritage significance; and
- formulate management/mitigation/conservation recommendations that reflect the cultural heritage significance values of the features identified.

4.10 Transport

4.10.1 Description of values

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, fuel, water;
- the volume of traffic associated with accommodating and transporting 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;
- need for increased road maintenance and upgrading; and
- consistency with road plans, programs at a network and link level.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

Maps should be provided showing the project in its local and regional context, including the transport infrastructure, including specific large scale plans showing critical intersections and interfaces with road, rail and other infrastructure.

4.10.2 Potential impacts and mitigation measures

The EIS should provide sufficient analysis and assessment of the impact on the road system from construction, operations, and decommissioning activities in the form of a road impact assessment according to Main Roads guidelines. The guidelines for the assessment of the above are detailed in the departmental publication *Guidelines for the Assessment of Road Impacts of Development Proposals*. Particular attention should be paid to impacts on road infrastructure, road users and road safety. The assessment should also take into consideration both the infrastructure and operation of existing facilities. The assessment should be for the projected life of the project and not less than 10 years after the completion of the expansion and any associated infrastructure. This assessment should provide the basis for the transport component of the EM Plan.

Sufficient information should also be provided to enable Queensland Rail to make an independent assessment of how the rail network (including infrastructure) will be affected.

Discuss any indirect and downstream road network requirements and impacts beyond the immediate mine site of the proposed activity; for example, intersections or rail crossings on account of extra rail and road traffic generated by the project. Special infrastructure or traffic issues that are linked to increased economic or social activity resulting from the mine should be documented, whether they are beneficial or detrimental.

Consideration should be given to ancillary goods and services, as well as to indirect impacts and system wide impacts, including the movement of oversized equipment to or from the project. While the movement of oversized vehicles may primarily involve the Peak Downs Highway, other highways and roads may be also relevant.

Specific consideration should be given to impacts of changed river or creek courses on state controlled roads, both with respect to the road asset within the road reserve as well as any impact on stream flows as this may impact adversely on structures and pavements.

The EIS should provide details of the impact on any current or proposed rail infrastructure. 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 project. 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 indicate clearly the corrective measures necessary to address adverse road impacts and the costs involved. Information about the impacts and proposed measures for dealing with those impacts should be prepared by the proponent into a road use management plan in close consultation with the Regional and District Office of the Department of Main Roads.

During the construction phase, measures should be put in place to minimise impacts on the State Controlled Road network during any haulage operations. Such measures could include for example, the use of legally loaded vehicles involved in cartage of any materials and the timing of cartage with respect to daily and seasonal factors.

4.11 Social

4.11.1 Description of social values

The function of this section is to describe the existing social values that may be affected by the project in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

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

- community infrastructure and services (such as childcare services), access and mobility;
- population and demographics of the affected community;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- local community values, vitality and lifestyles;
- recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;
- health and educational facilities;
- on farm activities near the project;
- current property values;
- number of properties directly affected by the project;
- 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;

Describe the environmental values of social attributes for the affected area in terms of:

- the integrity of social conditions, including amenity and livability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure.; and
- public health and safety.

4.11.2 Potential impacts and mitigation measures

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

The assessment of the impacts should describe the likely response of affected communities and identify the possible beneficial and adverse impacts (both direct and cumulative). These impacts should be considered at the local, regional and state level. 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. The capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the project is to be discussed;
- impacts on local residents' values and aspirations and;
- impacts on human service delivery.

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 project for future developments in the local area including constraints on surrounding land uses should be described.

The social impact assessment should include sufficient data to enable State authorities, such as Queensland Health and Education Queensland, to plan for the continuing provision of public services in the region of the project. Proponents of projects that are likely to result in a significant increase in population of an area should consult the relevant management units of the State authorities, and summarise the results of the consultations in the EIS. The summary should discuss how the impacts of population increase on public services, particularly health and education, would be mitigated.

Comment should be made on how much service revenue and work from the project (for example, 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.

The effects of the project on local and regional residents, including land acquisition and relocation issues and property valuation and marketability, community services and recreational activities should be described for the construction and operations phases of the development.

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

4.12 Health and safety

4.12.1 Description of environmental values

The function of this section is to describe the existing community values for health and safety that may be affected by the project activities in the context of environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

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, long shifts, and long distance travel. It should include details of;

- compliance with relevant health and safety legislation;
- security arrangements;
- emergency plans and safety management strategies;
- details of on-site emergency response capabilities for the construction and operational phases of the project; and
- the risk assessment conclusions reached and level of the off-site risk from the project.

4.12.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing health and safety community values, to describe how nominated quantitative standards and indicators may be achieved for social impact 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 impacts on the community in terms of health, safety, and quality of life from project operations and emissions.

Map(s) should be provided showing the locations of sensitive receptors, such as, but not limited to, kindergartens, schools, hospitals, aged care facilities, residential areas, and centres of work (such as office buildings, factories and workshops). The EIS, illustrated by the maps, should discuss how planned discharges from the project could impact on public health in the short and long term, and should include an assessment of the cumulative impacts on public health values caused by the project, either in isolation or by combination with other known existing or planned sources of contamination. Mitigation measures to protect health and safety values should be described.

The EIS should address the project's potential for providing disease vectors. Measures to control mosquito and biting midge breeding should be described. Any use of recycled water should be assessed for its potential to cause infection by the transmission of bacteria and/or viruses by contact, dispersion of aerosols, and ingestion

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

(via use on food crops). Similarly, the use of recycled water should be assessed for its potential to cause harm to health via the food chain due to contaminants such as heavy metals and persistent organic chemicals.

Practical monitoring regimes should also be recommended in this section.

4.13 Economy

4.13.1 Description of economic environment

This section describes the existing economic environment that may be affected by the project. The character and basis of the local and regional economies should be described including (if data available):

- existing housing market, particularly rental accommodation which may be available for the project workforce, including:
  - size of the private rental market in the area, such as 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 local land development and housing construction industries to provide new housing;
- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends.); and
- historical descriptions of large-scale resource developments and their effects in the region.

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 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 of the project.

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. Discuss impacts on housing and rent inflation, in particular the deterioration in housing affordability by low-income groups. The impacts of this project should be placed in the context of 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 the housing demand due to seasonal employment factors such as maintenance shutdowns). Discuss the impact of the construction phase of the project 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.

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.

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

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 project on the local and regional economic context;
- the long and short-term beneficial (such as job creation) and adverse (such as competition with local small business) impacts that are likely to result from the project (including impact on the reliability and quality of water supply for downstream users);
- 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 hazards;
- qualitatively determine the distributional effects of the project including proposals to mitigate any negative impact on disadvantaged groups;
- qualitatively determine the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- qualitatively determine 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

The function of this section is to describe the potential hazards and risk that may be associated with the mining activities in the context of their potential effect on environmental values as defined by the *Environmental Protection Act 1994* and Environmental Protection Policies.

Detail the environmental values likely to be affected by any hazardous materials and actions incorporated in the project. The degree of risk and sensitivity of the environmental values at risk should be detailed.

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 project 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 substance 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;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- 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 (such as *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 majors 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 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 measures and emergency procedures;
- emergency response plans (including evacuation plans/procedures);
- qualitative risk assessment; and
- construction safety.

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

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

5. Environmental Management Plan

The EM Plan for a proposed mining project is an integral part of the EIS. It should be developed from the preceding information in the EIS. Its purpose is to set out the proponent's commitments to environmental management, that is, how environmental values will be protected and enhanced. Protection of environmental values will be achieved by preventing or minimizing environmental harm in accordance with the commitments made in the text of the EIS. The EM Plan is based on these commitments. The general content of the EM Plan should comprise:

- The proponent's commitments to acceptable levels of environmental performance, including environmental objectives, that is, levels of expected environmental harm, performance standards and associated measurable indicators, including progressive and final rehabilitation, performance monitoring and reporting;
- Control strategies to implement the commitments; and
- Corrective actions to rectify any deviation from performance standards.

The conditions on the Environmental Authority for the proposed expansion of the mine will be drawn from the EMPlan.

6. References and recommended appendices

6.1 References

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

6.2 Recommended appendices

6.2.1 Final Terms of Reference for the EIS

A copy of the final ToR should be included in the EIS. A summary, cross-referencing specific items of the ToR to the relevant section of the EIS, should also be provided. Where it is intended to bind appendices in a separate volume from the main body of the EIS, the ToR at least should be bound with the main body of the EIS.

6.2.2 The standard criteria

A brief summary of the project's compatibility with ESD policy and other relevant policy instruments such as the standard criteria as defined by the *Environmental Protection Act 1994* should be presented. Consideration should focus on *The National Strategy for Ecologically Sustainable Development*, published by the Commonwealth Government in December 1992 (available from the Australian Government Publishing Service). Each principle should be discussed and conclusions drawn as to how the project conforms. A life-of-project perspective should be shown.

6.2.3 Study team

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

6.2.4 Glossary of terms

A glossary of technical terms and acronyms should be provided.

6.2.5 Specialist studies

All reports generated on specialist studies undertaken as part of the EIS are to be included as appendices.

These may include:

- flora and fauna studies;
- waterway hydrology;

Environmental Protection Agency
www.epa.qld.gov.au ABN 87 221 158 786

- groundwater;
- geology;
- economic studies;
- hazard and risk studies;
- land use and land capability studies;
- community consultation; and
- transport and infrastructure studies.

7. Approved by

signed	**19 January 2006**
Signature	Date

Dr Bill Dixon
Director, Integrated Assessment Branch
Environmental Operations
Environmental Protection Agency

Enquiries:
EIS Coordinator
Development Assessment Unit
Ph. (07) 3227 8141
Fax. (07) 3227 7720