Terms of reference for an environmental impact statement

Final terms of reference for the Millennium Expansion Project EIS

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Background

The Millennium Coal Mine is an existing open-cut coal mine, operated by Millennium Coal Pty Ltd (MCPL), a wholly owned subsidiary of Peabody Pacific Pty Ltd. MCPL proposes to extend the open-cut mining operation within areas covered by mining lease (ML) 70313, ML Application 70401 and Mineral Development Licence 136. The proposed open-cut extension is called the Millennium Expansion Project (MEP).

The Millennium Coal Mine is located in the Bowen Basin approximately 22km east of Moranbah and 16km southwest of Coppabella, within the Isaac Regional Council area. The mine is located adjacent to the Poitrel Coal Mine which is owned and operated by BHP Mitsui Coal Pty Limited.

The mine has been operating since 2005 with approval to produce at a rate of 1.9 million tonnes a year (Mt/y). The MEP proposes to increase the extraction rate to approximately 10 Mt/y run-of-mine (ROM) coal. The estimated mine life is a further 15 years from when the environmental approvals would be granted. The MEP proposes to continue the existing open-cut truck and excavator terrace mining methods, though the use of an electric shovel and/or a dragline may be considered at a later stage in the life of the mine. The size of current ROM and product stockpile areas would be increased to meet the additional throughput. The MEP would process the ROM coal onsite at the existing Coal Handling and Preparation Plant (CHPP) and the product coal would be transported via the existing rail network to the established Dalrymple Bay Coal Terminal for export.

Water would be sourced from the West Creek Environmental Control Dam, the CH4 Coal Seam Gas operation and the Burdekin Pipeline. The MEP may require an upgrade to the current power supply if alternative mining methods (e.g. electric shovel and/or dragline) are undertaken in the future.

Accommodation facilities would be provided for construction and operational contractors and personnel at the MAC Accommodation Village at Coppabella. Additional staff may be accommodated at the MAC Accommodation Village at Moranbah.

MCPL applied for, and has been granted, approval to prepare a voluntary environmental impact statement (EIS) for the project. The MEP is a controlled action that requires approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions under Division 1, Part 3 of the EPBC Act are section 18 and 18A (listed threatened species and communities). The State's EIS 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).

CONTENT OF THE EIS

Executive summary

The Executive Summary will be written as a stand alone document, able to be reproduced on request and distributed to interested parties who may not wish to read or purchase the EIS as a whole.

The function of the executive summary is to convey the most important aspects and options relating to the project to the reader in a concise and readable form. It should use plain English and avoid the use of jargon and esoteric terms.

The structure of the Executive Summary should follow that of the EIS, and focus strongly on key issues and conclusions to enable the reader to obtain a clear understanding of the MEP and its potential adverse and beneficial environmental, social and economic impacts, as well as the management measures to be implemented by the Proponent to mitigate all adverse impacts.

Glossary of terms

A glossary of technical terms, acronyms and abbreviations will be provided before the main text of the EIS.

1 Introduction

The function of the introduction is to explain why the EIS has been prepared and what it sets out to achieve. It will also define the audience to whom it is directed, and contain an overview of the structure of the document. Throughout the EIS, factual information contained in the document will be referenced.

1.1 Project proponent

Provide details of the project proponents, including details of any joint venture partners.

1.2 Project description

A brief description of the key elements of the MEP will be provided and illustrated. Any major infrastructure requirements will also be summarised. Detailed descriptions of the MEP will follow in section 3.

A brief description will be provided of studies or surveys that have been undertaken for the purposes of developing the MEP and preparing the EIS. This will include reference to relevant baseline studies or investigations undertaken previously.

1.3 Project objectives and scope

A statement of the objectives which have led to the development of the MEP and a brief outline of the events leading up to the MEP's formulation, including alternatives, envisaged time scale for implementation and project life, anticipated establishment costs and actions already undertaken within the MEP area.

Describe the current status of the MEP and outline the relationship of the MEP to other developments or actions that may relate whether or not they have been approved. The consequences of not proceeding with the MEP will also be discussed.

1.4 The environmental impact statement (EIS) process

The important aspect of this section is to make clear the methodology and objectives of the environmental impact statement under the relevant legislation.

1.4.1 Methodology of the EIS

This section will provide a description of the EIS process steps, timing and decisions to be made for relevant stages of the MEP. A brief description will be provided of studies or surveys that have been undertaken for purposes of developing the project and preparing the EIS. This will include reference to relevant baseline studies or investigations undertaken previously. This section will also indicate how the consultation process would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation. The information in this section is required to ensure:

- relevant legislation is addressed;
- readers are informed of the process to be followed; and
- stakeholders are aware of any opportunities for input and participation.

1.4.2 Objectives of the EIS

Having described the methodology of the EIS, a succinct statement will be made of the EIS objectives. The structure of the EIS can then be outlined as an explanation of how the EIS will meet its objectives. The reader should be able to distinguish the EIS as the key environmental document providing advice to decision makers considering approvals for the MEP.

While the TOR provides guidance on the scope of the EIS studies, they should not be seen as exhaustive or limiting. It is important for proponents and their consultants to recognise that there cannot be perfect knowledge in advance of undertaking an EIS of what the EIS studies may find.

If it transpires during the preparation of the EIS that previously unforeseen matters not addressed in the terms of reference are found to be relevant to the assessment of impacts of the MEP, those matters will be included in the EIS.

In addition, it is essential that the main text of the EIS addresses all relevant matters concerning environmental values, impacts on those values and proposed mitigation measures. No relevant matter should be raised for the first time in an appendix or the draft environmental management plan (EM plan).

The depth and scope of the assessment in the EIS will need to be commensurate with the values to be impacted and the scale of the impacts. When considering whether an impact is or is not significant, the Proponent will take account of both the intensity of the impact and the context in which it would occur.

The EIS is a public document. Its purpose is not only to provide information to regulatory agencies, but also to inform the public of the scope, impacts and mitigation measures of the MEP. As such, the main text will be written in plain English avoiding jargon as much as possible. Additional technical detail may be provided in appendices. The main text will not assume that a reader would have a prior knowledge of the MEP site. It should not be necessary for the reader to have visited the site to understand the issues involved in the MEP.

In brief, the EIS objectives should be to provide public information on the need for and likely effects of the MEP, 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. Discussion of options and alternatives and their likely relative environmental management outcomes is a key aspect of the EIS.

The role of the EIS in providing the MEP's draft EM plan will also be discussed, with particular reference to the EM plan's role in providing management measures that can be carried over into conditions that would attach to any approval(s), environmental authorities and permits for the MEP.

1.4.3 Submissions

Readers will be informed as to:

- how to make submissions;
- what form the submissions will take and required contact details;
- when submissions must be made to gain standing for any legal appeal process; and
- how submissions on the draft EIS will be addressed and taken into account in the decision-making process.

1.5 Public consultation process

An appropriate public consultation program is essential to the impact assessment. This section will outline the methodology that will be adopted to identify and mitigate socio-economic impacts of the MEP. Information about the consultation that has already taken place and the results of such consultation will be provided.

The submission of a list of affected persons and interested persons as well as a statement of how the Proponent proposes to consult with those persons is a statutory requirement of the EIS process in the *Environmental Protection Act 1994*.

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

The public consultation process will identify broad issues of concern to local community and interest groups and will continue from project planning through commissioning, project operations and final decommissioning. Refer to the DERM guideline '*Issue Identification and Community Consultation'.*

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

This section will explain the legislation and policies controlling the approvals process. The requirements for any approval under relevant State legislation will be discussed. Any exemption that may apply will also be discussed. Reference will be made to the Queensland *Environmental Protection Act 1994, Water Act 2000. Water Resource (Fitzroy Basin) Plan 1999, Fitzroy Basin Resource Operations Plan* and any other relevant Queensland laws. Any requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* will also be included. Local Government planning controls, local laws and policies applying to the development will be described where relevant.

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

1.6.2 Project approvals

A list of the approvals (including Local Government planning controls, local laws and policies) required for the MEP will be provided, including the expected timetable for approval of the various applications. This information is required to make clear how the MEP conforms to State, regional and local plans for the area.

1.6.3 Planning processes and standards

This section will discuss the consistency of the MEP with existing land uses or long-term policy framework for the area (e.g. as reflected in local and regional plans), and the legislation, standards, codes or guidelines available to monitor and control operations on site. This section will refer to all relevant State and regional planning policies. In particular, this section will highlight requirements of the *Environmental Protection Act 1994*, such as the Ecologically Sustainable Development (ESD) principles, 'best practice environmental management', 'general environmental duty', relevant Environmental Protection Policies (EPPs) i.e. Air, Noise, Water and Waste Management, and the *Environmental Protection Regulation 2008*.

1.7 Accredited process for controlled actions under Commonwealth legislation

The MEP is a controlled action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) requiring approval from the Federal Minister for the Environment, Heritage and the Arts. The controlling provisions under Division 1, Part 3 of the EPBC Act are: Section 18 and 18A (listed threatened species and communities). The State's EIS 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).

It will be necessary for the EIS to address potential impacts on the matters of national environmental significance (NES) that are identified in the controlling provisions. Schedule 4 of the Commonwealth's *Environment Protection and Biodiversity Conservation Regulations 2000* sets out the matters to be addressed in the EIS. The EIS will provide separate discussions under subheadings in the relevant sections of the EIS that address the prescribed matters. Alternatively, a stand-alone report could be provided and presented as a separate chapter of the EIS that exclusively and fully addresses the matters relevant to the controlling provisions. Whichever method is used, those parts of the EIS addressing matters of NES will be readily identifiable from the table of contents.

2 Project need and alternatives

2.1 Project justification

The justification for the MEP will be described, with particular reference made to the economic and social benefits, including employment and spin-off business development, which the MEP may provide. The status of the MEP will be discussed in a regional, State and national context.

2.2 Alternatives to the MEP

This section will describe feasible alternatives, including conceptual, technological and locality alternatives to the MEP, and discussion of the consequences of not proceeding with the MEP. Alternatives will be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others. Comparative environmental impacts of each alternative will be summarised.

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

Reasons for selecting the preferred options will include technical, commercial, social and natural environment aspects. In particular, principles of ESD and sustainable development will be included. The relationship of options chosen for waste management and any emissions produced will be detailed.

This information is required to assess why the scope of the MEP 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 MEP.

3 Description of the MEP

This section will describe the MEP through its lifetime with emphasis on those aspects that will change as a consequence of the increased coal production rate and or additional areas to be mined. Where appropriate, each section will also address the various stages of the MEP i.e. planning, construction, operation and decommissioning. It also allows further assessment of which approvals may be required. Maps or figures showing the position of features or boundaries will use the latitudes and longitudes on the GDA94 datum. Latitudes and longitudes on the GDA94 datum will also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals.

3.1 Location

3.1.1 Regional context

The regional context of the MEP will be described and illustrated on maps at suitable scales.

3.1.2 Local context

The local context of the MEP will be described and include real property descriptions of the MEP site and adjacent properties. Maps at suitable scales will be provided showing the precise location of the MEP area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the MEP area is or will be subject;
- the location and boundaries of the MEP footprint showing all key aspects including excavations, stockpiles, areas of fill, watercourses, plant locations, water storages, buildings, bridges, culverts, hardstands, car parks, etc; and
- the location of any proposed buffers surrounding the working areas.

This section will include a rectified air photo enlargement (preferably A3 size) to illustrate components of the MEP in relation to the land and mining tenures and natural and built features of the area.

3.2 Construction

The extent and nature of the MEP's construction phase will be described. The description will include the type and methods of construction, the construction equipment to be used and the items of plant to be transported onto the construction site. Sources of construction materials and their associated haulage routes will also be identified for assessment purposes.

Any staging of the MEP will be described and illustrated showing site boundaries, development sequencing and timeframes.

The estimated numbers of people to be employed in the MEP construction phase will also be provided with a brief description of where those people may be accommodated and/or how they will be transported to the site.

3.3 Operations

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

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

Concept and layout plans will 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, will be described.

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

3.3.1 Tenements and tenures

Describe and illustrate any existing mining tenements, geothermal and petroleum tenures overlying and adjacent to the MEP site, and any proposed tenure applications for the MEP.

3.3.2 Resource base and mine life

Summarise the results of studies and surveys undertaken to identify the mineral and natural resources required to implement the proposal (further detail should be provided in section 4.2.1.2, Geology). The location, volume, tonnage and quality of natural resources required will be described (e.g. land, water, timber, energy, etc.). Specific details will be provided on the following:

- the proposed mine life and an outline of the coal/mineral resource base including the total thickness of seams or extent of the ore body;
- the planned recovery of resources;
- locations of any resources that would be sterilised by the planned activities; and
- the quantity of coal/mineral to be mined annually including any proposed ramping of production or staging of development.

3.3.3 Mining methods and equipment

Specific details will be provided of the following:

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

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

3.3.4 Mine sequencing

Specific details will be provided of the following:

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

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

3.3.5 Workforce

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

3.3.6 Processing and products

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

3.3.7 Ongoing evaluation and exploration activities

This section will describe the extent and nature of any proposed ongoing exploration or geological/geo-technical evaluation within the MEP area that may be required over the life of the MEP.

3.4 Product handling

This section will describe and show on plans (at an appropriate scale), the existing and 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 a discussion of any environmental design features of these facilities, including bunding of storage facilities.

3.5 Infrastructure requirements

This section will provide descriptions, with concept and layout plans, of requirements for constructing, upgrading or relocating all infrastructures associated with the MEP. The locations of any necessary infrastructure easements will be shown on the plan. The matters to be considered include such infrastructure as roads, rail, bridges, jetties, ferries, tracks and pathways, conveyors, dams and weirs, bore fields, power lines and other cables, wireless technology (e.g. microwave telecommunications), and pipelines for any services (whether underground or above).

3.5.1 Transport—road/rail/conveyor/air/ship

Provide an overview of the arrangements for the transport of plant, equipment, products, wastes and personnel during both the construction phase and operational phases of the MEP will be described. The description will cover the use of existing facilities and all requirements for the construction, upgrading or relocation of any transport related infrastructure.

3.5.2 Energy

The EIS will describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the MEP. The locations of any easements will be shown on the infrastructure plan. The EIS will describe measures to protect energy easement interests, including access for maintenance and operational works. Energy conservation will be briefly described in the context of any Commonwealth, State and local government policies.

3.5.3 Water supply, demand and storage

The EIS will provide information on water usage by the MEP, including the quality and quantity of all water supplied to the site. In particular, the proposed and optional sources of water supply will be described (e.g. bores, any surface storages such as dams and weirs, municipal water supply pipelines). This section will detail the proposed construction of any water supply or storage works required. Any storages to take overland flow water will be detailed along with their storage capacities.

The EIS will discuss dewatering if it is proposed to be used as a water source. It will detail any treatment required of this water source.

This section will detail any investigative work required in determining the availability of the supply.

Reference will be made to the regulatory requirements under the *Water Act 2000* that may be associated with access to water supply, including a water licence to take water for dewatering under the *Water Act 2000*.

Estimated rates of supply from each source (average and maximum rates) will be given. Any proposed water conservation and management measures will be described.

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

3.5.4 Stormwater drainage

An illustrated description will be provided of the proposed stormwater drainage system (i.e. mine water management system) and the proposed disposal arrangements, including any off-site services. Contour plans at a suitable scale (1m contours in areas of low relief) will be provided with site facility locations superimposed to show contributing catchments for disturbed areas under the MEP.

3.5.5 Sewerage

This section will describe, in general terms, the sewerage infrastructure required by the MEP. If it is intended that industrial effluent or relatively large amounts of domestic effluent are to be discharged into an existing sewerage system, an assessment of the capacity of the existing system to accept the effluent will be provided in Section 4.3 Waste. For industrial effluent, this will include detail of the physical and chemical characteristics of the effluent(s).

3.5.6 Telecommunications

The EIS will describe any impacts on existing telecommunications infrastructure (such as optical cables, microwave towers, etc.) and identify the owners of that infrastructure.

3.5.7 Accommodation and other infrastructure

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

- camps, townships or residential developments;
- fuel storage areas;
- equipment hardstand and maintenance areas; and
- technical workshops and laboratories.

3.6 Waste management

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

- the tonnage of raw materials processed;
- the amount of resulting process wastes; and
- the volume and tonnage of any re-usable by-products.

Schematic diagrams, which for the operational phase may be simplified versions of those provided in section 3, will be provided for each distinct stage of the MEP (e.g. construction/site preparation, commissioning, operation and decommissioning) indicating the processes to be used and highlighting their associated waste streams (i.e. all waste outputs: solid, liquid and gaseous), including recycling efforts, such as stockpiling and reusing topsoil. The schematic diagrams, or an associated table, will cross-reference the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described. The physical and chemical characteristics of waste material from the process plant will be provided.

Having regard for best practice waste management strategies and the Environmental Protection (Waste) Policy, the proposals for waste avoidance, reuse, recycling, treatment and disposal will be described in the appropriate sub-section below. Information will 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 will be detailed especially as to how these concepts have been applied to preventing or minimising environmental impacts at each stage of the MEP. Details on natural resource use efficiency (e.g. energy and water), integrated processing design, co-generation of power and by-product reuse as shown in a material/energy flow analysis will be presented.

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

3.6.1 Air emissions

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

The methods to be employed in the mitigation of impacts from air emissions should be described in section 4.6 Air.

3.6.2 Excavated waste

This section will describe and show the location, design and methods for constructing dumps for waste rock and subsoil. The location of the dumps will be shown on a map relative to topography and other natural features of the area. The following will be detailed and discussed:

- An estimated tonnage and/or volume of waste rock and subsoil to be produced annually.
- Results of waste rock and subsoil characterisation that includes the net acid producing potential of the mined waste rock (metals analysis, sulfides, pH, conductivity, sodic, saline, Net Acid Producing Potential (NAPP), Net Acid Generation (NAG) and Acid Neutralising Capacity (ANC)).
- Characterisation will also address the properties of waste rock and subsoil that affect their erosion potential. Sampling will be representative with profiles of all geological units included and based on accepted statistical procedures and be in accordance with recognised guidelines.
- Details of any likely leachate quality expected under field conditions, including contaminants such as sulfate, pH, chloride, iron, major cations and anions, and any chemical species in sufficient quantity that is likely to be reactive and/or toxic.
- Measures to ensure stability of the waste dumps, particularly the management of drainage.
- Slope profiles that are consistent with intended land use and acceptable post-mining land management and maintenance.
- Alternatives for excavated waste disposal, including in-filling of voids, off-site options and treatment of any contaminated soil.

3.6.3 Tailings or fine rejects

This section will describe the tailings waste produced by preparation and/or processing plants and the proposed methods for its disposal. Alternative options for tailings disposal including the proposed location, site suitability and volume of any tailings storage and/or disposal site(s), including the method of construction will be described.

The approximate quantity of tailings to be produced by the MEP and its processing plant annually for the life of the mine will be described. Tailings characterisation information will also be presented in this section, including:

- physical properties of the tailings solids;
- geochemical properties of the tailings solids using static testing (Net Acid Production Potential (NAPP), NAG etc); and
- chemical properties of tailings pore-water including pH, conductivity, major cations and anions, and any chemical species in sufficient quantity that is likely to be reactive and/or toxic.

The construction of the tailings storage facility will be described with regards to construction material and design sufficient to determine storage volume relationships and the basic stability of the design. The EIS will address how the tailings storage facility complies with relevant codes for the construction of such containment systems.

Describe the strategies to monitor and manage seepage into ground and surface waters. The location of the storage and/or disposal site with regard to adjacent creeks and rivers will be described.

3.6.4 Solid waste disposal

The quantity and quality of solid wastes (other than waste rock, subsoil and tailings addressed in other sections) and the proposed methods of their disposal will be described. The proposed location, site suitability, dimensions and volume of any landfill, including its method of construction, will be shown.

3.6.5 Liquid waste

A description will be presented of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the MEP other than that addressed in previous sections. Particular attention will be given to the capacity of wastes to generate acid, and saline or sodic wastewater. A water balance for the MEP and processing plant is required to account for the estimated usage of water.

The EIS must consider the following effects:

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

3.7 Rehabilitation and decommissioning

This section will present and describe the options, strategies and methods for both progressive and final rehabilitation of the environment disturbed by the MEP. The strategic approach to progressive and final rehabilitation will be described. A preferred rehabilitation strategy will be developed with a view to minimising the amount of land disturbed at any one time. The final topography of any excavations, waste areas and dam sites will be shown on maps at a suitable scale.

The strategies and methods presented for progressive and final rehabilitation of disturbed areas will demonstrate compliance with the objectives of the Guideline 18: *Rehabilitation requirements for mining projects* and the *Technical guidelines for the environmental management of exploration and mining in Queensland (1995)* except where superseded by Guideline 18. In particular, the strategies and methods will have the following objectives:

- mining and rehabilitation will aim to create a landform with land use capability and/or suitability similar to that prior to disturbance unless other beneficial land uses are pre-determined and agreed;
- mine wastes and disturbed land will 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 will not be degraded to a significant extent. Current and future water quality will be maintained at levels that are acceptable for users downstream of the site.

The means of decommissioning the MEP, in terms of the removal of plant, equipment, structures and buildings will be described, and the methods proposed for the stabilisation of the affected areas will be given. Information will 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 will be discussed in sufficient detail for their feasibility and suitability to be established.

Describe any proposals to divert creeks during operations, and, if applicable, the reinstatement of the creeks after operations have ceased. The EIS will consider and recommend the levee protection required for any pits, voids, uncompacted overburden and workings arising in the MEP that might be subject to inundation during operation and decommissioning. Where dams are to be constructed, proposals for the management of these structures after the completion of the MEP will be given. Also, the final drainage and seepage control systems and long-term monitoring plans will be described. The EIS should also demonstrate where final voids and uncompacted overburden and workings at the end of mining would lie in relation to flood levels up to and including the “probable maximum flood level” based on the Bureau of Meteorology’s “probable maximum precipitation” forecast for the locality.

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

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

4 Environmental values and management of impacts

The functions of this section are to:

- Describe the existing environmental values of the area which may be affected by the MEP. Environmental values are defined in section 9 of the *Environmental Protection Act 1994*, environmental protection policies and other documents such as the ANZECC 2000 guidelines and South East Queensland Regional Water Quality Management Strategy. Environmental values may also be derived following recognised procedures, such as described in the ANZECC 2000 guidelines. Environmental values will be described by reference to background information and studies, which will be included as appendices to the EIS.
- Describe the potential adverse and beneficial impacts of the MEP on the identified environmental values. Any likely environmental harm on the environmental values will be described.
- Describe any cumulative impacts on environmental values caused by the MEP, either in isolation or by combination with other known existing or planned development or sources of contamination.
- Propose environmental protection objectives and commitments. All environmental protection commitments must be measurable and auditable.
- Examine viable alternative strategies for managing impacts. These alternatives will be presented and compared in view of the stated objectives and standards to be achieved. Available techniques, including best practice, to control and manage impacts to the nominated objectives will be discussed. This section will detail the environmental protection measures to be used in the planning, construction, operations, decommissioning, rehabilitation and decommissioning stages of the project and any associated works for the MEP. Measures will prevent, or where prevention is not possible, minimise environmental harm and maximise socio-economic and environmental benefits of the MEP. Preferred measures will be identified and described in more detail than other alternatives.
- Describe any computational model used to make predictions of impacts and/or outcomes of mitigation measures. The description will address the inputs, assumptions, limitations, sensitivities, accuracy and precision of the model.

Any maps or figures showing the position of features or boundaries will use latitudes and longitudes on the GDA94 datum. Latitudes and longitudes on the GDA94 datum will also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals.

Environmental protection objectives may be derived from legislative and planning requirements which apply to the MEP including Commonwealth strategies, State planning policies, local authority strategic plans, environmental protection policies under the *Environmental Protection Act 1994*, and any catchment management plans prepared by local water boards or land care groups. Special attention will be given to those mitigation strategies designed to protect the values of any sensitive areas and any identified ecosystems of high conservation value within the area of possible proposal impact.

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

- 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 (refer to any background studies in appendices - note such studies may be required over several seasons). It will be explained how the environmental values were derived (e.g. by citing published documents or by following a recognised procedure to derive the values).
- Impact on environmental values: describe quantitatively the likely impact of the MEP on the identified environmental values of the area. The cumulative impacts of the MEP must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of the Great Barrier Reef Marine Park Authority, relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans will be addressed.
- Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial, aquatic and marine ecosystems must be discussed in the relevant

sections. This assessment will include air and water sheds affected by the MEP and other proposals competing for use of the local air and water sheds.

- Where impacts from the MEP will not be felt in isolation to other sources of impact, it is recommended that the proponent develop consultative arrangements with other industries in the MEP's area to undertake cooperative monitoring and/or management of environmental parameters. Such arrangements will be described in the EIS.
- 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). The measurable indicators and standards can be determined from legislation, support policies and government policies as well as the expected performance of control strategies. Objectives for progressive and final rehabilitation and management of contaminated land will be included.
- Control strategies to achieve the objectives: describe the control principals, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives; include designs, relevant performance specifications of plant. Details are required to show that the expected performance is achievable and realistic.
- Environmental offsets: Information is required to show that measures have been taken to avoid and minimise potential adverse impacts of the proposal. Environmental offsets will be proposed to counterbalance any remaining loss of environmental values, consistent with the specific-issue offset policies under the framework of the Queensland Government *Environmental Offset Policy 2008*.
- Monitoring programs: describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals.
- Auditing programs: describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed.
- Management strategies: describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented, such as by a 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.
- Information quality: information given under each element will also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

It is recommended that where possible the final TOR and the EIS follow the heading structure below. The mitigation measures, monitoring programs, etc., identified in this section of the EIS will be used to develop the environmental monitoring program for the MEP (refer to Section 5, EM Plan).

4.1 Climate

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

The potential impacts due to climatic factors will be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion will be addressed in Section 4.2.2.6. The impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) will be addressed in Section 4.4 with regard to contamination of waterways and in Section 4.3 with regard to the design of the waste containment systems. The impacts of winds, rain, humidity, and temperature inversions on air quality will be addressed in Section 4.5.

4.2 Land

4.2.1 Description of environmental values

This section describes the existing environmental values of the land area that may be affected by the proposal. It will 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 Topography/geomorphology

The topography of the MEP site and any other potentially impacted area will be detailed with contours at suitable increments, shown with respect to Australian Height Datum (AHD) and drafted to the GDA 94 datum. Significant features of the locality will be included on the maps. Such features will include any locations subsequently referred to in the EIS (e.g. the nearest noise sensitive locations) that are not included on other maps in Section 4.2. Commentary on the maps will be provided highlighting the significant topographical features.

4.2.1.2 Geology

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

4.2.1.3 Mineral resources and ore reserves

The EIS will provide a summary of the results of studies and surveys undertaken to identify and delineate the mineral resources and ore reserves within the MEP mining leases (including any areas underlying related infrastructure).

The location, tonnage and quality of the mineral resources and ore reserves within the proposed mining leases will be described in detail as indicated below and, where possible, it will be presented on a 'seam by seam' basis and include the modifying factors and assumptions made in arriving at the estimates. The mineral resources and ore reserves will 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.

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

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

4.2.1.4 Soils

A soil survey of the sites affected by the MEP will be conducted at a suitable scale, 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. Soil surveys will be undertaken in accordance with

the *Guideline for Surveying Soils and Land Resources* (McKenzie et al, 2008). Information will also be provided on soil stability and suitability for construction of proposal facilities.

Soils will be described and mapped at a suitable scale of 1:10 000 or better. The soils will be described according to the *Australian soil and land survey field handbook* (National Committee on Soil and Terrain, 3rd Edition, 2009) and *Australian soil classification* (Isbell, Revised Edition, 2002). An appraisal of the depth and quality of useable soil will be undertaken. An assessment will be made of each soils agricultural land suitability in accordance with Guidelines for agricultural land evaluation in Queensland (Land Resources, 1990) *Planning guidelines: the identification of Good Quality Agricultural Land* (DPI, DHLGP, 1993), and the *State Planning Policy 1/92: Development and the conservation of agricultural land*.

4.2.1.5 Land use

The EIS will provide a description of current land tenures and land uses, including native title issues, in the MEP 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 will be shown.

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

Describe the land use suitabilities of the affected area in terms of the physical and economic attributes. The assessment will set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes. The limitations and land suitability classification system to use is that in Attachment 2 of *Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (1995).

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

4.2.1.6 Infrastructure

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

4.2.1.7 Sensitive environmental areas

The proximity of the proposal to any environmentally sensitive areas will be shown on a map of suitable scale and with outlines of the MEP infrastructure superimposed. This section of the EIS will then identify whether any of those environmentally sensitive areas could be affected, directly and indirectly, by the proposal.

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

In addition, this section will also address the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* and whether there are national environmentally significant matters in the proposal area.

4.2.1.8 Landscape character

This section will describe in general terms the existing character of the landscape that will be affected by the MEP. It will comment on any changes that have already been made to the natural landscape since European settlement. It will 'set the scene' for the description of particular scenic values in the following section on visual amenity. The difference being that this section describes the general impression of the landscape that would be obtained while travelling through and around it, while the visual amenity section addresses particular panoramas and views (e.g. from constructed lookouts, designated scenic routes, etc.) that have amenity value.

4.2.1.9 Visual amenity

This section will describe existing landscape features, panoramas and views that have, or could be expected to have, value to the community whether of local, regional, State-wide, national or international significance. Information in the form of maps, sections, elevations and photographs is to be used, particularly where addressing the following issues:

- identification of elements within the MEP and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps;
- 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 along the route;
- focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the MEP site;
- character of the local and surrounding areas including character of built form (scale, form, materials and colours), vegetation (natural and cultural vegetation), directional signage and land use;
- identification of the areas of the MEP 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.

4.2.2 Potential impacts and mitigation measures

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

4.2.2.1 Resource Utilisation

With regard to the resource stewardship, the EIS will analyse the effectiveness of the mining proposal in achieving the optimum utilisation of the mineral resources within the MEP area and consider its impacts on other resources. It will demonstrate that the mining proposal will 'best develop' the mineral resources within the MEP 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.

The EIS will provide detail on how the company plans to manage low grade and/or current uneconomic material to ensure that non-sterilisation of this significant potential future resource is considered. The EIS will detail the basis for any non-stockpiling or sterilisation of current un-economic material. This section will also provide details and maps of expected residual or remnant resources within the project area including: any low grade stockpiles; tailings; and current un-economic material.

4.2.2.2 Land use suitability

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

The potential environmental harm caused by the MEP on the adjacent areas currently used for agriculture, urban development, recreation, tourism, other business and the implications of the MEP for future developments in the impact area including constraints on surrounding land uses will be described. If the development adjoins or potentially impacts on good quality agricultural land, then an assessment of the potential for land use conflict is required. Investigations will follow the procedures set out in the planning guideline, *The Identification of Good Quality Agricultural Land, which supports State Planning Policy 1/92.*

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

4.2.2.3 Subsidence

This section will provide comprehensive surface subsidence predictions taking into account factors such as topographic variations and geological complexities, with a full description of the methodology and including an assessment of the reliability of the predictions. The results of the predictions will be shown on maps with 1m contour increments and a scale appropriate for assessment of surface subsidence impacts. Mitigation measures will be proposed to deal with any significant impacts to the identified environmental values that would result from subsidence.

4.2.2.4 Land disturbance

A strategy will be developed that will minimise the amount of land disturbed at any one time. The strategic approach to progressive rehabilitation of landforms and final decommissioning will be described with particular regard to the impacts in the short, medium and long timeframes. The methods to be used for the MEP, including backfilling, covering, re-contouring, topsoil handling and revegetation, will be described. However, a description of erosion and sediment control could be deferred to section 4.2.2.6. Any proposals to disturb land that would impede or divert overland flow or waterways, and any subsequent reinstatement, during construction or operations will be first described in this section. However, the potential impacts of interfering with flow on the quantity and quality of water resources will be assessed in section 4.4. Also, the final drainage and seepage control systems and any long-term monitoring plans will be described.

In addition to assessing the operational phase of land disturbance, the EIS will address the ultimate changes following implementation of the decommissioning and rehabilitation plan described in section 3.7. The EIS will detail the proposed long-term changes that will occur to the land after mining ceases compared to the situation before mining commences. Those changes will be illustrated on maps at a suitable scale and with contours at intervals sufficient to assess the likely drainage pattern for ground and surface waters (though the assessment of the impacts on drainage and water quality will be provided in the water resources section of the EIS). The mitigation measures for land disturbance to be used on decommissioning the site will be assessed in sufficient detail to decide their feasibility. In particular, the EIS will address the long-term stability of final voids and spoil dumps, safety of access to the site after surrender of the lease, and the residual risks that will be transferred to the subsequent landholder.

Rehabilitation success criteria for land disturbance will be proposed in this section while rehabilitation success criteria for revegetation will be proposed in the section on nature conservation.

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

4.2.2.5 Land contamination

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

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

A preliminary site investigation (PSI) of the site consistent with the DERM's *Draft guidelines for the assessment and management of contaminated land in Queensland* will be undertaken to determine background contamination levels. The results of the PSI will be summarised in the EIS and provided in detail in an appendix.

If the results of the preliminary site investigation indicate potential or actual contamination, a detailed site investigation progressively managed in accordance with the stages outlined in Appendix 5 of the *'Draft guidelines for the assessment and management of contaminated land in Queensland'* will be undertaken.

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

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

The EIS will 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 DERM website at: www.derm.qld.gov.au/ecoaccess/contaminated_land/guidelines_and_information_sheets/. The Proponent will refer study proposals to DERM for review prior to commencement.

4.2.2.6 Erosion and stability

For all permanent and temporary landforms, possible erosion rates and management techniques will be described. For each waste rock and soil type identified, erosion potential (wind and water) and erosion management techniques will be outlined. An erosion-monitoring program, including rehabilitation measures for erosion problems identified during monitoring, will also be outlined. Mitigation strategies will be developed to achieve acceptable soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations.

The report will include an assessment of likely erosion and stability effects for all disturbed areas such as:

- areas cleared of vegetation;
- waste dumps;
- stockpiles;
- dams, banks and creek crossings;
- the plant site, including buildings; and
- access roads or other transport corridors.

Methods proposed to prevent or control erosion will be specified and will be developed with regard to (a) the long-term stability of waste dumps and voids; (b) preventing soil loss in order to maintain land capability/suitability, and (c) preventing significant degradation of local waterways by suspended solids. The mitigation measures will address the selective handling of waste rock and capping material to maximise long-term stability of final landforms in regard to slumping and erosion both on and below the surface. Erosion control measures will be developed into an erosion and sediment control plan for inclusion in the EM plan.

4.2.2.7 Landscape character

Describe the potential impacts of the MEP landscape character of the site and the surrounding area. Particular mention will be made of any changes to the broad-scale topography and vegetation character of the area, such as due to spoil dumps, excavated voids and broad-scale clearing.

Details will be provided of measures to be undertaken to mitigate or avoid the identified impacts.

4.2.2.8 Visual amenity

This section will analyse and discuss the visual impact of the MEP on particular panoramas and outlooks. It will be written in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation, from road, cycle and walkways, from the air and other known vantage points day and night, during all stages of the MEP as it relates to the surrounding landscape. The assessment is to address the visual impacts of the MEP 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 MEP.

Detail will be provided of all management options to be implemented and how these will mitigate or avoid the identified impacts.

4.2.2.9 Lighting

Management of the lighting of the MEP, 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.

4.3 Transport

The transport section of the EIS will have separate subsections describing infrastructure associated with the various modes of transport, such as road, rail, air and sea.

4.3.1 Description of existing infrastructure and values

Provide details of the proposed use of existing infrastructure for the transport of materials, products or wastes to and from the MEP site. Also provide details, either in the transport section of the EIS or by cross reference to other sections, of the environmental values that would be affected by the altered use of existing transport infrastructure or the construction of new or altered infrastructure. The EIS will provide details of any MEP related plant or utilities within, or impacting on, the jurisdiction of any transport authority. Also provide details of the likely traffic to be generated by workforce personnel and service providers.

For road and rail transport, describe separately and in detail the existing or new road and rail networks that would be used by the MEP. Provide illustrations of the networks at suitable scales. For each mode of transport and each phase of the MEP, the EIS will describe: the expected volumes and weights of materials, products, hazardous goods or wastes; the likely number and timing of trips; the types of vehicles to be used; and the routes. The description will include, but not necessarily be limited to, details of access and haul roads, realignments, rail loops and load-out facilities, and level crossings used by any transport associated with the MEP. Provide details of any heavy or oversized loads, including the number and type of vehicles, with a description of the likely timing and routes of those loads highlighting any vulnerable bridges or other structures along the proposed routes.
In relation to air transport, describe the existing, new, and/or altered air fields and associated infrastructure that would be used by the MEP. Describe the likely additional number of flights, frequency, timing (particularly any increase in night arrivals or take-offs), and size of aircraft. Describe any features of the MEP that could impact on air transport (e.g. the placement of waste dumps, stacks or flares beneath flight paths).

In relation to the importation or export of materials and products, the EIS will identify any aspects of the MEP that will increase the shipment of materials through any port. Details will be provided of the ports that will be used, the berths at those ports, likely size and number of vessels, and the associated infrastructure that moves and stores materials between the ships and the rail and/or road networks.

4.3.2 Potential impacts and mitigation measures

The EIS will provide sufficient information to make an independent assessment of how transport infrastructure will be affected by each phase of the MEP at a local and regional level. Similarly, sufficient information will be provided to make an independent assessment of how transport used by the MEP will impact on environmental values. In both cases, the impacts along the whole length of each affected route will be discussed and measures proposed to avoid or mitigate the impacts.

Details will be provided of the:

- results of any modeling of transport impacts;
- assessment methodology used, including a summary of consultation undertaken with transport authorities regarding the scope of the impact assessment and methodology to be used;
- base data assumptions, including an assessment of the current condition of the affected network and its performance;
- possible interruptions to transport operations; and
- likelihood and nature of spills of products or hazardous materials during transport, and the requirements for dealing with any spills.

This section of the EIS will outline, and cross-reference to more detailed descriptions with the EIS, the impacts of transport associated with the MEP on amenity, human health and ecological values as a result of dust, noise, vibration and any other environmental effects.

The assessment of road impacts will be in accordance with the latest version of the Department of Main Road's *Guidelines for Assessment of Road Impacts of Development*, available from the website: http://www.mainroads.qld.qov.au.

In relation to road impacts, the EIS will include an assessment of impacts on:

- the safety, efficiency and condition of road operations and assets;
- any existing or proposed pedestrian cycle networks;
- any existing public transport networks (assets and services); and
- watercourses and overland flows, and their interaction with the current and future road network (note: impacts on water values due to transport infrastructure will be outlined in the transport section of the EIS and cross-referenced to a detailed assessment in the water resources section).

The assessment of impacts on the rail network itself, or on environmental values affected by changes in rail traffic (e.g. due to dust, noise and vibration) will also consider the following matters:

- impacts at interface points with other private and public transport pathways such as roadway level crossings or occupational crossings (i.e. those crossings which form part of private access pathways to and from residential or business sites); and
- impacts on passenger transport and services.

The EIS will assess any impacts on any port due to the import or export of materials or products. Matters to be assessed will include the need for:

- new coastal works, such as berth construction or alteration, land reclamation, etc.;
- any dredging for shipping channels and swing basins;
- new or altered stockpile areas; and
- new or altered infrastructure to handle materials between ships and road or rail transport.

The EIS will also assess any impacts on nearby areas due to the handling or storage of materials at ports (e.g. because of dust, noise or lighting).

Any potential impacts of the MEP on water traffic in rivers and dams will be assessed.

The EIS will assess: any impacts of the MEP on existing air fields and flight paths; any impacts on environmental values due to the need to redevelop or construct new airfields; and any impacts on amenity due to increased air traffic. The proposal and assessment will have regard to State Planning Policy 1/02: *Development in the Vicinity of Certain Airports and Aviation Facilities*. With regard to air safety matters to be assessed include the raising of landforms or the construction of stacks, flares or lighting within flight paths.

If the works that could result in impacts, or the associated mitigation works for identified impacts, are the responsibility of the proponent then the EIS will fully assess those impacts, detail the mitigation works and carry the environmental protection commitments forward into the MEP's EM plan.

If the proponent will not be responsible for the works associated with the impacts (e.g. for dredging at a port) the EIS will clearly identify the entity that will be responsible and what approvals would be needed. Nevertheless, in this case, the EIS will provide enough assessment of the likely impacts of all associated activities for the regulatory authorities to have confidence that approval of the MEP subject to this EIS process would not have unacceptable flow-on impacts due to necessary works farther down the transport chain.

The proponent will detail measures to avoid or mitigate impacts on each transport mode. The mitigation measures will ensure the safety, efficiency and condition of each mode is maintained. These mitigation measures are to be prepared by the proponent in close consultation with the relevant transport authorities. Any residual impacts that cannot be avoided will be identified and quantified.

Mitigation strategies must include:

- consideration of any transport authority's works program and forward planning;
- proposed construction plans of all required transport infrastructure works in accordance with relevant and accepted authority standards and practices;

- the responsible parties for any works;
- estimates of costs;
- details on the timing of the works; and
- a summary of relevant approvals and legislative requirements needed to implement mitigation strategies and transport infrastructure works required by the MEP.

The EIS will consider public transport requirements and links to, or development of pedestrian and cycle networks.

4.4 Waste

This section will complement other sections of the EIS by providing technical details of waste treatment and minimisation, with proposed emission, discharge and disposal criteria, while other sections describe how those emissions, discharges and disposals would impact on the relevant environmental values. The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EM plan.

4.4.1 Description of environmental values

This section will introduce and briefly describe the existing environment values that may be affected by the MEP's wastes. Refer to each of the waste streams described in section 3.6 and provide references to more detailed descriptions of the relevant environmental values in other sections of part 4 of the EIS.

4.4.2 Potential impacts and mitigation measures

The purpose of this section is to bring together a description of the preferred methods (and discuss any alternatives) to be used to deal with waste streams and outline their impacts. The full description of the magnitude and nature of impacts on particular environmental values due to the management of waste will be provided in the relevant sections of part 4 of the EIS.

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

As part of the description, and unless issues related to excavated waste have been addressed in section 4 (in which case reference will be made to the appropriate subsection), this section will 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;
- hazards associated with the handling and storage of wastes;
- the potential level of impact on environmental values;
- proposed discharge/disposal criteria for liquid and solid wastes;
- measures to ensure stability of the dumps and impoundments will be described;
- methods to prevent, seepage and contamination of groundwater from stockpiles and/or dumps will be given;
- design criteria to be used to ensure that waste containment and/or storage facilities perform satisfactory;
- market demand for recyclable waste (where appropriate) will be addressed;
- waste minimisation techniques processes proposed; and
- decommissioning of the site.

Having regard to the *Environmental Protection (Waste Management) Policy 2000*, the EIS will indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all

phases of the MEP. The DERM has also released draft guidelines covering aspects of waste management under the *Environmental Protection (Waste Management) Policy 2000*, which will be addressed.

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

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

4.5 Water resources

4.5.1 Description of environmental values

This section describes the existing environment for water resources that may be affected by the MEP in the context of environmental values as defined or considered in such documents as the *Environmental Protection Act 1994, Environmental Protection (Water) Policy 1997 (EPP (Water))*, ANZECC 2000, the National Water Quality Management Strategy (NWQMS), the DERM Guideline: *Establishing draft environmental values and water quality objectives* and the *Queensland Water Quality Guidelines 2006,* the *Water Act 2000,* the *Water Resources (Fitzroy Basin) Plan 1999* and associated *Resource Operations Plan,* and the *Water Resources (Great Artesian Basin) Plan 2006* and associated *Resource Operations Plan.* The definition of waters in the *Environmental Protection (Water) Policy 1997* includes the bed and banks of waters, so this section will address benthic sediments as well as the water column.

4.5.1.1 Surface waterways

A description will be given of the surface watercourses and their quality and quantity in the area affected by the MEP with an outline of the significance of these waters to the river catchment system in which they occur. Details provided will include a description of existing surface drainage patterns, and flows in major streams and wetlands. Also provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the MEP. Flood studies will include a range of annual exceedance probabilities for affected waterways, based on observed data if available or use appropriate modelling techniques and conservative assumptions if there are no suitable observations. The flood modelling assessment will include local flooding due to short duration events from contributing catchments on site, as well as larger scale regional flooding including waterways downstream.

The EIS will 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 will form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the MEP.

An assessment is required of existing water quality in surface waters and wetlands likely to be affected by the MEP. The basis for this assessment will be a monitoring program, with sampling stations located upstream and downstream of the MEP including reference locations (i.e. non-impacted sites). Downstream monitoring will include sites located near to any proposed discharge points in addition to further downstream locations. Sites will include permanent and semi-permanent ponded water holes or known aquatic habitat. Complementary stream-flow data will also be obtained from historical records (where available) to aid in interpretation. The condition of the water environment should be assessed by making comparison against water quality objectives and water quality guidelines (based on ANZECC & ARMCANZ 2000 and Queensland Water Quality Guidelines 2006).

The water quality will be described, including seasonal variations or variations with flow where applicable. Monitoring of ephemeral streams will primarily focus on times of natural flow. A relevant range of physical, chemical and biological parameters will be measured to gauge the environmental harm on any affected creek or wetland system. This will include, but not be limited to, water quality indicators likely to be affected by the MEP such as electrical conductivity, specific identified metals (dissolved), turbidity, suspended sediments and pH. Biological indicators should include macro-invertebrate assessment according to published methods.

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; and
- any water resource plans, water quality improvement plans, land and water management plans relevant to the affected catchment.

4.5.1.2 Groundwater

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

This section of the EIS will address any requirement for a licence to take groundwater for dewatering purposes if that is indicated by preliminary groundwater investigations. A groundwater model will be required if a groundwater resource is encountered at the MEP that will be impacted by mining activities.

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

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

A network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations will be developed and described in the EIS.

This section of the EIS will address the nature and hydrology of the aquifers and provide a description of the:

- geology/stratigraphy - such as alluvium, volcanic, metamorphic;
- aquifer type - such as confined, unconfined;
- depth to and thickness of the aquifers;
- the significance of the resource at a local and regional scale;
- depth to water level and seasonal changes in levels;
- groundwater flow directions (defined from water level contours);
- interaction with surface water;
- interaction with sea/salt water;
- possible sources of recharge; and
- vulnerability to contamination.

The data obtained from the groundwater survey will be sufficient to enable specification of the major ionic species, pH, electrical conductivity, total dissolved solids and any potentially toxic or harmful substances.

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; and
- physical integrity, fluvial processes and morphology of groundwater resources.

4.5.2 Potential impacts and mitigation measures

This section is to assess potential impacts on water resource environmental values identified in the previous section. It will also define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

The EIS will describe the possible environmental harm caused by the proposed proposal to environmental values for water as expressed in the Environmental Protection (Water) Policy. The DERM Operational Policy *Waste water discharge to Queensland waters* may be consulted for guidance on how discharge proposals will be assessed.

Where a licence or permit will be required under the *Water Act 2000* to take or interfere with the flow of water, this section of the EIS will provide sufficient information for a decision to be made on the application. Similarly, waterway barrier works may need approval under the *Fisheries Act 1994*, and if so will be addressed in the EIS.

The EIS will assess potential impacts of the MEP on flows in the watercourse(s) and overland flow at points immediately downstream of the MEP.

Water management controls will be described, addressing surface and groundwater quality, quantity, drainage patterns and sediment movements. The beneficial (environmental, production and recreational) use of nearby marine, surface and groundwater will be discussed, along with the MEP for the diversion of affected creeks during mining, and the stabilisation of those works. Monitoring programs will be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the MEP.

Key water management strategy objectives include:

- protection of the integrity of the marine environment, and ultimately the Great Barrier Reef Marine Park and World Heritage property;
- 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 dependent biota; and
- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the MEP.

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

4.5.2.1 Surface water and water courses

The potential environmental harm to the flow and the quality of surface waters from all phases of the MEP will be discussed, with particular reference to their suitability for the current and potential downstream uses, including the requirements of any affected riparian area, wetland, estuary, littoral zone, and any marine and in-stream biological uses. The impacts of surface water flow on existing infrastructure will be considered with reference to the *Environmental Protection (Water) Policy 1997* and *Water Act 2000*.

The hydrological impacts of the MEP will be assessed, particularly with regard to: stream diversions (whether temporary or permanent); scouring and erosion; the consequent impacts of subsidence; and changes to flooding levels and frequencies both upstream and downstream of the MEP. When flooding levels will be affected, modelling of afflux will be provided and illustrated with maps.

Quality characteristics discussed will be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water (including concentrations of constituents) at the point of entering natural surface waters will be discussed along with toxicity of effluent constituents to flora and fauna. Consideration will be given to impacts on all local and downstream connected waterways due to discharge from the site. Stream flow data will be used in combination with proposed discharge rates to estimate in-stream dilution and water quality. Consideration will be given to the available assimilative capacity of the receiving waters given existing background levels and other known and significant potential point source discharges in the catchment.

Reference will be made to the properties of the land disturbed and processing plant wastes, the technology for settling suspended clays from contaminated water, and the techniques to be employed to ensure that contaminated water is contained and successfully treated on the site.

In relation to water supply and usage, and wastewater disposal, the EIS will discuss anticipated flows of water to and from the MEP area. Where dams, weirs or ponds are proposed, the EIS will investigate the effects of predictable climatic extremes (storm events, floods and droughts) on: the capacity of the dams to retain contaminants; 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 will follow the current technical guidelines on site water management.

The need or otherwise for licensing of any dams (including referable dams) or creek diversions, under the *Water Act 2000* will be discussed. Water allocation and water sources will be established in consultation with DERM.

Assess the impacts on water resources of any dams and roads and other infrastructure related to the MEP and propose management measures for identified impacts.

Having regard for the requirements of the *Environmental Protection (Water) Policy*, the EIS will 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 will be discussed.

The Australian and New Zealand Environment and Conservation Council (ANZECC & ARMCANZ 2000) *National Water Quality Management Strategy, Australian Water Quality Guidelines for Fresh and Marine Waters, Queensland Water Quality Guidelines 2006* and the Environmental Protection (Water) Policy 1997 will be used as a reference for evaluating the effects of various levels of contamination.

Options for mitigation and the effectiveness of mitigation measures will be discussed with particular reference to sediment, acidity, salinity, metals and other emissions of a hazardous or toxic nature to human health, flora or fauna.

Where it is proposed that creeks will be diverted, the EIS will detail how rehabilitation will affect both the physical and ecological condition of the creek's bed and banks and the quality of water in it. Furthermore, the EIS will 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.

4.5.2.2 Groundwater

The EIS will include an assessment of the potential environmental harm caused by the MEP to local groundwater resources.

The impact assessment will define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the MEP 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 MEP will be described.

An assessment will be undertaken of the impact of the MEP 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 will be discussed.

4.6 Air

4.6.1 Description of environmental values

This section will describe the existing air shed environment which may be affected by the MEP in the context of environmental values as defined by the *Environmental Protection Act 1994*, EPPs and Regulations.

A description of the existing air shed environment will be provided having regard for particulates and relevant gaseous compounds. The EIS will discuss the background levels and sources of suspended particulates and any other relevant constituent of the air environment that may be affected by the MEP.

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

4.6.1.1 Greenhouse gas emissions

This section of the EIS will:

- provide an inventory of projected annual emissions for each relevant greenhouse gas, with total emissions expressed in 'CO2 equivalent' terms;

- estimate emissions from indirect activities associated with the MEP, including fossil fuel based electricity consumed; and
- briefly describe method(s) by which estimates were made.

The Australian Department of Climate Change's *National Greenhouse Accounts (NGA) Factors* (available via the internet) can be used as a reference source for emission estimates and supplemented by other sources where practicable and appropriate. The MEP EIS will include estimates of coal seam methane to be released as well as emissions resulting from such activities as transportation of products and consumables, and energy use by the MEP.

4.6.2 Potential impacts and mitigation measures

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

The objectives for air emissions will be stated in respect of relevant legislation, emission guidelines and standards (ambient and ground level concentrations) and the particulate emissions modelled using a recognised atmospheric dispersion model. The potential for interaction between the emissions from the processing plant, and emissions in the air shed, and the likely environmental harm from any such interaction, will also be detailed. If relevant, shut-down thresholds will be identified if meteorological conditions are such that unacceptable impacts on any sensitive areas are unavoidable.

The proposed levels of particulate emissions will be provided in terms of the *Environmental Protection (Air) Policy 2008* and the *National Environment Protection (Ambient Air Quality) Measure* (July, 2003).

The predicted average ground level concentrations at nearby sensitive areas (e.g. residences) will be modelled and described. These predictions will be made for both normal and expected maximum emission conditions and the worst case meteorological conditions will be identified and modelled where necessary. Ground level predictions will be made at any residential, industrial and agricultural developments believed to be sensitive to the effects of predicted emissions. The techniques used to obtain the predictions will be referenced and key assumptions and data sets will be explained.

The assessment of the MEP's impact on air quality will consider and describe:

- The air quality modelling results in light of the limitations and accuracy of the applied atmospheric dispersion models.
- The air quality results with relevance to the goals in the *Environmental Protection (Air) Policy 2008* and the *National Environment Protection (Ambient Air Quality) Measure*.
- The contamination control equipment and techniques to be employed on the MEP to suppress or minimise dust emissions.
- The back up measures to be incorporated that will act in the event if failure of primary measures to minimise the likelihood of adverse air impacts.
- Provide an air emission inventory of the proposed site for all potential emission sources including fugitive emissions from such activities as mining, and rail and road transport of product or wastes. Provide a complete list of emissions to the atmosphere, including particulates and PM_{10}.
- For other than insignificant emissions, undertake an impact assessment with relevant inputs of emissions and local meteorology using an 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 ground level concentration (GLC) at the nearest sensitive receptor(s) based on 1-hour average for maximum concentration (99.9 percentile). Simulate monthly average dust deposition at the nearest sensitive receptor(s). Results of the dispersion modelling must be presented as maximum hourly and annual average concentration contour plots and maximum monthly average dust deposition contour plots. The predicted 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 air quality modelling results will be discussed in light of the limitations and accuracy of the applied models.
- Where there is no single atmospheric dispersion model that is able to handle the different atmospheric dispersion characteristics exhibited in the proposal area (e.g. strong convection, terrain features, temperature inversions and contaminant re-circulation), a combination of acceptable models will need to be applied.
- The averaging period for ground level concentrations of contaminants that are modelled should be consistent with the relevant averaging periods for air quality indicators and goals in the Environmental Protection (Air) Policy 2008 and National Environmental Protection (Ambient Air Quality) Measure (NEPM) Air.
- Evaluate whether any planned buffer distance(s) between the facility and neighbouring sensitive receptors will be adequate during 'worst case' emissions that may occur during operations.
- Modelled air quality concentrations at the most exposed existing or likely future off-site sensitive receptors must be compared with the appropriate national and international ambient air quality standards including the Environmental Protection (Air) Policy 2008 and the National Environmental Projection Council (Ambient Air Quality) Measure.
- Evaluate cumulative impacts of the proposed emissions on the receiving environment by considering the MEP in conjunction with other known and available emission sources within the region. Describe air shed management and the contribution of the MEP to the air shed capacity in view of existing and future users of the airshed for assimilation and dispersion of emissions.
- The human health risk associated with emissions from the operation of all hazardous or toxic contaminants should be assessed whether they are or are not covered by the National Environmental Protection Council (Ambient Air Quality) Measure or the Environmental Protection (Air) Policy 2008.
- For any proposal that does not meet the Environmental Protection (Air) Policy 2008 air quality objectives, the proponent will undertake a risk assessment to determine the level of risk of adverse impact off site. Risk management strategies also need to be developed that identify options that will reduce exposure of local communities to levels of indicators that may be of concern and how to meet the objectives of Environmental Protection (Air) Policy 2008 progressively over the long-term.

The EIS will define and describe measures to suppress or minimise emissions, including dust from all potential emission sources. The environmental impact/nuisance of coal dust caused by the transportation of coal by road/rail will also be addressed as part of the EIS process. In relation to the rail transport of coal, the EIS will describe the proposed measures designed to minimise coal dust emissions from trains during the haulage of coal from the MEP to the proposed export port.

4.6.2.1 Greenhouse gas abatement

This section of the EIS will propose and assess greenhouse gas abatement measures. Where relevant it will include:

- a description of the proposed measures (alternatives and preferred) to avoid and/or minimise greenhouse gas emissions directly resulting from activities of the MEP, including such activities as transportation of products and consumables, and energy use by the MEP;
- an assessment of how the preferred measures minimise emissions and achieve energy efficiency,
- a comparison of the preferred measures for emission controls and energy consumption with best practice environmental management in the relevant sector of industry; and
- a description of any opportunities for further offsetting greenhouse gas emissions through both direct and indirect means.

Direct means of reducing greenhouse gas emissions could include such measures as:

- minimising clearing at the site;
- integrating transport for the MEP with other local industries such that greenhouse gas emissions from the construction and running of transport infrastructure are minimised;
- maximising the use of renewable energy sources; and

- co-locating coal seam methane use for energy production with coal extraction.

Indirect means of reducing greenhouse gas emissions could include such measures as:

- carbon sequestration at nearby or remote locations by:
  - progressive rehabilitation of disturbed areas; and
  - planting trees or other vegetation external to the MEP to achieve greater biomass than that cleared for the MEP.
- carbon trading through recognised markets.

The Environmental Management Plan will include a specific module to address greenhouse abatement. That module will include:

- commitments to the abatement of greenhouse gas emissions from the MEP with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions;
- commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency;
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management;
- any voluntary initiatives such as projects undertaken as a component of the national Greenhouse Challenge Plus program, or research into reducing the lifecycle and embodied energy carbon intensity of the project's processes or products;
- opportunities for offsetting greenhouse emissions, including, if appropriate, carbon sequestration and renewable energy uses; and
- commitments to monitor, audit and report on greenhouse emissions from all relevant activities and the success of offset measures.

4.6.2.2 Climate change adaptation

Climate change, through alterations to weather patterns and rising sea level, has the potential to impact in the future on developments designed now. Most developments involve the transfer to, or use by, a proponent of a community resource in one form or another, such as the granting of a non-renewable resource or the approval to discharge contaminants to air, water or land. It is recognised that the MEP design should be adaptive to climate change so that community resources are not depreciated or abandoned or require costly modification before their potential to provide a full return to the community is realised. Consequently, the EIS will provide an assessment of the MEP's vulnerabilities to climate change and describe possible adaptation strategies for the activity including:

- a risk assessment of how changing patterns of rainfall and hydrology, temperature, extreme weather and sea level (where appropriate) may affect the viability and environmental management of the MEP.
- the preferred and alternative adaptation strategies to be implemented; and
- commitments to undertaking, where practicable, a cooperative approach with government, other industry and other sectors to address adaptation to climate change.

DERM recognises that predictions of climate change and its effects have inherent uncertainties, and that a balance must be found between the costs of preparing for climate change and the uncertainty of outcomes. Nevertheless, the Proponent will use their best efforts to incorporate adaptation to climate change in their EIS and project design.

4.7 Noise and vibration

4.7.1 Description of environmental values

This section describes the existing environment values that may be affected by noise and vibration from the MEP.

If the proposed activity could adversely impact on the noise environment, baseline monitoring will be undertaken at a selection of sensitive sites that are potentially affected by the MEP. Noise sensitive places are defined in the *Environmental Protection (Noise) Policy 2008*. Measured background noise levels that take into account seasonal variations are required. The locations of sensitive sites will be identified on a map at a suitable scale. The results of any baseline monitoring of noise and vibration in the proposed vicinity of the MEP will be described.

Sufficient data will be gathered to provide a baseline for later studies. The daily variation of background noise levels at nearby sensitive sites will be monitored and reported in the EIS, with particular regard given to detailing variations at different periods of the night. Monitoring methods will adhere to accepted best practice methodologies, relevant DERM guidelines and Australian Standards, and any relevant requirements of the *Environmental Protection Regulation 2008* and *Environmental Protection (Noise) Policy 2008*.

Comment will be provided on any current activities near the MEP area that may cause a background level of ground vibration (for example: major roads, excavation activities, etc.).

4.7.2 Potential impacts and mitigation measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by noise and vibration, describes how nominated quantitative standards and indicators may be achieved for noise and vibration management, and how the achievement of the objectives will be monitored, audited and managed. The assessment of noise impacts will include matters raised in the document *The health effects of environmental noise – other than hearing loss* published by the enHealth Council, 2004 (or later editions), ISBN 0 642 82304 9.

Information, including mapped noise contours from a suitable acoustic model, will be submitted based on the proposed generation of noise. The potential environmental harm of noise and vibration at all potentially sensitive places, in particular, any place of work or residence will be quantified in terms of objectives, standards and indicators to be achieved. Particular consideration should be given to emissions of low-frequency noise; that is, noise with components below 200Hz.The assessment should also include the environmental impacts on terrestrial animals and avifauna, particularly migratory species.

Proposed measures for the minimisation or elimination of potential impacts will be provided, including details and illustrations of any screening, lining, enclosing or bunding. A discussion will be provided of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise.

Information will 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, residence, recreation, worship and general amenity. The magnitude, duration and frequency of any vibration will be discussed. A discussion will be provided of measures to prevent or minimise environmental nuisance and harm associated with blasting and vibration emissions. Reference will also be made to the DERM Guideline: *Noise and vibration from blasting*.

The assessment will also address off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the MEP.

4.8 Nature conservation

4.8.1 Description of environmental values

This section will describe the existing environment values for nature conservation that may be affected by the MEP.

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

- integrity of ecological processes, including habitats for 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.

A discussion will be presented on the nature conservation values of the areas likely to be affected by the MEP. The flora and fauna communities which are rare or threatened, environmentally sensitive localities including

waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and ecological corridors will be described. The description will include a plant and vertebrate species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation from a local, regional and state perspective. The description will indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) or approved aquatic conservation assessment (ACA), if available produced by the DERM (e.g. see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006).

Survey effort will be sufficient to identify, or adequately extrapolate, the floral and faunal values over the range of seasons, particularly during and following a wet season. The survey will account for the ephemeral nature of watercourses traversing the MEP area, and seasonal variation in fauna populations.

The EIS will identify sensitive areas, or areas that may have low resilience to environmental change, in proximity to the MEP or its associated activities. Areas of special sensitivity include corridors, wetlands, wildlife breeding or roosting areas, any significant habitat or relevant bird flight paths for migratory species, bat roosting and breeding caves including existing structures such as adits and shafts, and habitat of threatened plants, animals and communities.

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

- protected areas, including nature refuges, which have been proclaimed under the *Nature Conservation Act 1992* or are under consideration for proclamation;
- critical habitat identified under the *Nature Conservation Act 1992;*
- important habitats of species listed under the *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* as presumed extinct, endangered, critically endangered, vulnerable or rare;
- vegetation mapped as essential habitat;
- high value regrowth vegetation;
- regional ecosystems listed as 'endangered' or 'of concern' under State legislation, and/or ecosystems listed as presumed extinct, endangered, critically endangered or vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- good representative examples of remnant regional ecosystems or regional ecosystems which are described as having ‘medium’ or ‘low’ representation in the protected area estate as defined in the Regional Ecosystem Description Database (REDD) available at DERM’s website;
- 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 important 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), between Australia and China (CAMBA) and/or between Australia and the Republic of Korea (ROKAMBA);
- 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 of known palaeontologic significance such as fossil sites;
- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term; such land may contain:
    - natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or
    - degraded vegetation or other habitats that still supports high levels of biodiversity or acts as an important 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; and

- ecosystems which provide important ecological functions such as: wetlands of national, state and regional significance; coral reefs; riparian vegetation; important buffer to a protected area or important habitat corridor between areas.

Reference will be made to both State and Commonwealth endangered species legislation and the proximity of the area to any World Heritage property.

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

The occurrence of pest plants and animals in the MEP area will be described.

4.8.1.1 Terrestrial flora

Provide a map of terrestrial vegetation at a suitable scale with descriptions of the units mapped. Within each defined vegetation community, surveys will be undertaken at intensity commensurate with the type and extent of vegetation present using recognised Queensland herbarium mapping protocols (Neldner et. al. 2005).

Sensitive or important vegetation types will 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 will be specifically addressed. The surveys will include species structure, assemblage, diversity and abundance. The description will contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests.

The existence of important local and regional weed species will also be discussed, including their impact on existing biodiversity values.

Vegetation mapping will include adjacent areas to illustrate interconnectivity. Mapping should also illustrate any larger scale interconnections between areas of remnant or regrowth vegetation where the project site includes a corridor connecting those other areas.

The terrestrial vegetation communities within the affected areas will be described at an appropriate scale (maximum 1:10 000) with mapping produced from aerial photographs and ground-truthing, showing the following:

- location and extent of ecosystems listed as ‘endangered’, ‘of concern’ and ‘not of concern’ under State legislation, non-remnant vegetation on State lands, and high-value regrowth vegetation;
- location and extent of ecosystems listed as presumed extinct, endangered, critically endangered or vulnerable under the EPBC Act;
- location and extent of vegetation types using the DERM’s regional ecosystem type descriptions in accordance with the REDD;
- location of vegetation types of conservation significance based on DERM’s regional ecosystem types and occurrence of species listed as protected plants under the *Nature Conservation (Wildlife) Regulation* 2006and subsequent amendments, as well as areas subject to the *Vegetation Management Act 1999*;
- 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);
- any plant communities of cultural, commercial or recreational significance should be identified,; and
- the location and abundance of any exotic or weed species.

Within each defined (standard system) vegetation community, a minimum of three sites (numbers should be discussed with DERM) will be surveyed for plant species, preferably in both summer and winter, as follows:

- site data shall be recorded using the Queensland Herbarium methodology and proformas in the latest version of the *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland* (DERM, 2005);
- the minimum site size should be 10 by 50 metres;
- a complete list of species present at each site should be recorded;

- the relative abundance of plant species present should be recorded;
- any plant species of conservation, cultural, commercial or recreational significance should be identified; and
- specimens of species listed as protected plants under the *Nature Conservation (Wildlife) Regulation 2006*, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

Existing information on plant species may be used instead of new survey work provided that the data is derived from previous surveys at the site consistent with the above methodology. Methodology used for flora surveys will be specified in the appendices to the report.

4.8.1.2 Terrestrial fauna

The terrestrial and riparian fauna occurring in the areas affected by the MEP will be described, noting the broad distribution patterns in relation to vegetation, topography and substrate. The description of the fauna present or likely to be present in the MEP will include:

- species diversity (i.e. a species list) and abundance of animals, including amphibians, birds, reptiles and mammals;
- any species that are poorly known but suspected of being rare or threatened;
- habitat requirements and sensitivity to changes; including movement corridors, edge-related effects, barriers to movement and waterways;
- the existence of feral or exotic animals;
- existence of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans); and
- use of the area by migratory birds, nomadic birds, bats, and arboreal and ground-dwelling fauna.

A comprehensive vertebrate fauna survey will be undertaken at a sampling intensity that supports the scale of vegetation mapping (i.e. 1:10 000 or better). Apart from the species recorded in the survey, an indicative list of all known and potential species and threatened species in the project area will be provided, by reference to the regional ecosystems within the project area and a 100km buffer, and knowledge of species present in the local bioregion. The occurrence of fauna of conservation significance should be geocoded to mapped vegetation units or habitats, which can then be used in section 4.8.2 to propose areas to be protected.

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

Methodologies used during the fauna survey, including the prevailing climatic conditions during the survey, will be specified.

4.8.1.3 Aquatic biology

The aquatic flora and fauna occurring in the areas affected by the MEP will be described, noting the patterns and distribution in the waterways and any associated wetland environments. The description of the fauna and flora present or likely to be present in the MEP area will include:

- fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area;
- aquatic plants and fish habitats;
- aquatic and benthic substrate; and
- habitat upstream and downstream of the project or potentially impacted due to currents in associated lacustrine environments.

The EIS should provide a description to Order or Family taxonomic rank of the presence and nature of stygofauna occurring in groundwater likely to be affected by the MEP. Sampling and survey methods should follow the best practice guideline which is currently that published by the Western Australian Environmental Protection Authority – *Guidance for the assessment of Environmental Factors No.54 (December 2003) and No.54a (August 2007)*.

4.8.2 Potential impacts and mitigation measures

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

The EIS will address any actions of the MEP or likely impacts that require an authority under the *Nature Conservation Act 1992*, and/or would be assessable development for the purposes of the *Vegetation Management Act 1999.* The EIS will detail any areas proposed to be cleared that will not be exempt from the provisions of the *Integrated Planning Act 1997* and the *Vegetation Management Act 1999*.

The discussion will cover all likely direct and indirect environmental harm due to the MEP on flora and fauna, particularly sensitive areas. Terrestrial and freshwater aquatic environments will also be described as well as the potential human impacts and the control of any domestic animals introduced to the MEP area. Access any significant impact on aquatic values resulting from any proposed water management structures, including dams, weirs or diversions.

Strategies for protecting any rare or threatened species will be described, and any obligations imposed by State or Commonwealth legislation or policy or international treaty obligations (i.e. JAMBA, CAMBA and ROKAMBA) will be discussed.

In any groundwater aquifers found to contain stygofauna, describe the potential impacts on stygofauna of any changes in the quality and quantity of the groundwater, and describe mitigation measures that would be applied to demonstrate lack of threat in accordance with best practice, which at present is guided by the Western Australian Environmental Protection Authority – *Guidance for the Assessment of Environmental Factors No.54 (December 2003) and No.54a (August 2007)*.

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

The potential environmental harm to the ecological values of the area arising from the construction, operation and decommissioning of the MEP including clearing, salvaging or removal of vegetation will be described, and the indirect effects on remaining vegetation will also be discussed. Short-term and long-term effects will be considered with comment on whether the impacts are reversible or irreversible. The capacity of the environment to assimilate discharges and emissions should be assessed.

Mitigation measures and/or offsets will be proposed for adverse impacts, where relevant. Any departure from no net loss of ecological values will be described.

Key flora and fauna indicators will be identified for future ongoing monitoring. Reference sites for monitoring rehabilitation will be established.

The EIS will propose and describe in detail, measures to be taken to avoid and minimise potential adverse impacts of the proposal nature conservation and biodiversity values. Any potential net loss of environmental values will be identified and quantified. Environmental offsets will be described that would counterbalance the remaining loss of environmental values. Proposed environmental offsets will be consistent with the requirements set out in the specific-issue offset policies under the framework of the *Queensland Government Environmental Offset Policy (QGEOP) 2008.*

The potential environmental harm on flora and fauna due to any alterations to the local surface and ground water environment will be discussed with specific reference to environmental impacts on riparian vegetation or other sensitive vegetation communities. Measures to mitigate the environmental harm to habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains will be described.

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

Weed and pest management strategies are required for containing existing exotic species (e.g. Parthenium, declared pests, and environmental weeds) and ensuring no new declared plants are introduced to the area. Feral animal management strategies and practices will also be addressed. The study will develop strategies to ensure that the MEP does not contribute to increased encroachment of a feral animal species. Reference will be made to the local government authority's pest management plan when determining control strategies. The strategies for both flora and fauna will be discussed in the main body of the EIS and provided in a working form in a Pest Management Plan as part of the overall EM Plan for the project.

Rehabilitation of disturbed areas will incorporate, where appropriate, provision of nest hollows and ground litter. Where the rehabilitation outcome of the EIS includes native vegetation, local indigenous species should be sourced from a local seed bank.

4.9 Cultural heritage

4.9.1 Description of environmental values

This section of the EIS will describe the existing cultural heritage values that may be affected by the MEP and include a description of the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms.

Unless an exemption applies under s86 of the *Aboriginal Cultural Heritage Act 2003*, an indigenous cultural heritage study must be undertaken in accordance with the requirements of Part 7 of that Act.

A non-indigenous cultural heritage study will also be undertaken of the known and potential historical cultural heritage values of the affected area. The study will, as a minimum, include a desktop analysis and an archaeological investigation (i.e. a physical investigation) of the area potentially affected by the MEP.

This initial desktop component of the study will, as a minimum, review the following sources for information on historical cultural heritage values within the region of the MEP site:

- the Queensland Heritage Register, for places already protected under the *Queensland Heritage Act 1992*;
- local government heritage registers, lists or inventories; and
- the results of previous cultural heritage studies conducted within the region of the MEP.

The scope of the archaeological investigation will be based upon the results of the desktop analysis and previous archaeological surveys and management efforts. Any additional archaeological investigations will be conducted by an appropriately qualified person, as required by the *Queensland Heritage Act 1992*, and will address all types of historical cultural heritage places located within the MEP area (i.e. built, archaeological and cultural landscape values).

The discovery and protection of any previously unidentified significant archaeological artefacts or archaeological places during the course of the historical cultural heritage study must comply with Part 9 of the *Queensland Heritage Act 1992.*

4.9.2 Potential impacts and mitigation measures

This section defines and describes the objectives and practical measures for managing, protecting or enhancing cultural heritage values that may be affected by the MEP. It describes how practices may be implemented for the appropriate management of those values, and how the achievement of the objectives will be monitored, audited and managed.

4.9.2.1 Indigenous cultural heritage

Unless an exemption applies under s86 of the *Aboriginal Cultural Heritage Act 2003*, the potential impacts on indigenous cultural heritage values in the vicinity of the project must be managed under a cultural heritage management plan (CHMP) developed and approved under Part 7 of that Act. Development of the CHMP should follow the guidelines gazetted under section 85 of the *Aboriginal Cultural Heritage Act 2003*. DERM's EIS Coordinator must be made aware of the progress of the CHMP approval process and of any related issues that should be addressed in the EIS assessment report.

4.9.2.2 Non-indigenous cultural heritage

The potential impacts on non-indigenous cultural heritage values and their avoidance or mitigation will also be addressed in a management plan. The historical heritage management plan will specifically address identified values and provide a process for managing values should they become apparent during development of the MEP.

The development of a historical heritage management plan will be negotiated with the lead agency (the Cultural Heritage Branch, DERM) and any other relevant stakeholders.

The historical heritage management plan will as a minimum address the following issues:

- Processes for the mitigation, management and protection of identified non-indigenous cultural heritage values during excavations of the construction, operational, rehabilitation and decommissioning phases of the MEP.
- Processes for reporting, as required by section 89 of the *Queensland Heritage Act 1992*, the discovery of any archaeological artefact not previously identified in the historical cultural heritage study.
- Procedures for the collection of any artefact material, including appropriate storage and conservation.
- Historical cultural heritage awareness training or programs for project staff.

The historical heritage management plan will be incorporated into the MEP's draft EM plan.

4.10 Social

The description of the social and cultural values potentially impacted by the project, and the assessment of the impacts on those values, should be conducted in consultation with the Social Impact Unit of the Department of Infrastructure and Planning, and all affected local, State and Federal government bodies.

4.10.1 Description of social and cultural values

This section of the EIS should define and describe the social and cultural area of influence of the project and any associated activities. It should identify key social and cultural organisations, including relevant government, quasi-non-government and non-government organisations, and other community groups. This section of the EIS should also describe the community engagement process and present its findings to date.

The EIS should describe the current population and demographics of the potentially affected communities within the project's social and cultural area of influence. Such communities include all communities likely to be impacted directly and indirectly by the project, such as the potential host communities and the source communities for the project workforce and their families. Separate population figures and demographics should be provided for affected indigenous and non-indigenous populations and communities. Characteristics to be described include:

- the community size, history, age structure, ethnic characteristics, and gender composition;
- average income profiles, including the number and proportion of low income households;
- education and skill level by age and gender;
- prevalence of disability;
- health and wellbeing indicators;
- major trends and changes in the population make-up that may be occurring irrespective of the project; and
- any additional information identified as relevant through engagement with the communities.

Describe and analyse the current employment patterns, rates and trends within the social and cultural area of influence, for the indigenous and non-indigenous populations, including:

- the locations and types of other significant places of employment;
- numbers employed in relevant industry sectors and demographic cohorts (including disadvantaged groups);
- shift patterns and hours of work;
- type and level of qualifications and skills;
- unemployment rates or shortage levels within relevant skill levels and sectors; and
- any other relevant historical or anticipated changes or shifts in these employment patterns, rates and trends.

The EIS should describe the settlement patterns and residential profile of communities within the social and cultural area of influence, including:

- household size;
- type of occupancy (e.g. families versus singles house sharing);

- length of occupancy, including generational continuity (e.g. of farming properties);
- current property values and trends;
- home ownership rates;
- the size of the private rental market;
- typical rents for the area, including trends;
- the vacancy rate of rental accommodation with an assessment of seasonal fluctuations;
- rates of housing stress, e.g. availability, affordability, and adequacy;
- comparative affordability for ownership and renting relative to other towns and centres; and
- constraints and opportunities for new housing construction in the local communities, including the capacity of the local land development and housing construction industries to provide new housing and accommodation.

The EIS should provide a profile of the current social and cultural values and the characteristics of communities, groups and individuals likely to be impacted by the proposal. The social and cultural values for the affected communities and populations should be described in terms of:

- the use of the area on and around the project site for business (including industry, agriculture, forestry, fishing, aquaculture, and education), cultural purposes (including the gathering of natural products for food, medicine or ceremonial purposes), or residential purposes;
- the historical, aesthetic, social and cultural significance of places to people who use, or have used, potentially affected places in the area;
- the sense of community;
- the integrity of social conditions, including perceptions of community cohesion and personal safety; and
- amenity, liveability, harmony and well being.

Describe the current availability of community access to recreational facilities and sites, and to social and community services and infrastructure.

Outline the current rates of crime against persons and property, and the likely rate of substance abuse as far as it is known.

Social, economic and cultural values are not as easily separated as physical and ecological values. Therefore it may be necessary for some material in this section to be cross-referenced with section 4.9, Cultural Heritage, and section 4.12, Economy.

4.10.2 Potential impacts and mitigation measures

The assessment of impacts (both beneficial and adverse) must be supported by evidence-based discussions, and be developed in consultation with all relevant government agencies and community groups. It should include information obtained so far through the project's community engagement process, and provide a description of how consultation feedback has identified and informed the assessment of impacts and the development of mitigation measures. The assessment should not consider the impacts of the project in isolation, rather it should discuss the likely direct, indirect and cumulative impacts of the project in conjunction with all known existing and planned projects within the area of influence. The assessment should address not only impacts on people and families directly affected by those matters, but also impacts on associated people and communities, such as those whose livelihoods would be affected by loss or gain of direct or indirect (e.g. service provision) employment.

With regard to its timeframe, the assessment of social impacts should cover:

- the state of affairs immediately before the project was proposed;
- the period from when people first became aware of the project until it is commissioned, should approval be given;
- the proposed active phases of the project (e.g. construction, operation and decommissioning); and

- the phase after the project ceases to the extent that there may be residual impacts.

Describe the likely impacts on population numbers in the social and cultural area of influence and the associated demographic shifts.

Describe the social impacts of changes in land use, the alienation of property and loss of connection with the land. It should also address the impacts and stresses associated with relocations.

Describe likely recruitment schedules and locations, and how recruitment during the various phases of the project will impact on employment patterns, rates, and trends within the social and cultural area of influence. The assessment should at least address the following matters:

- estimated employment rates including the number of staff to be employed, with an estimate of the numbers in the various trades and sectors (e.g. clerical staff, unskilled labour, etc.);
- estimated impacts on unemployment levels, including creation of labour shortages within skilled, semi-skilled and unskilled trades and sectors;
- employment trends such as attraction (cross-over) of workforce between trades and sectors or changes to sector numbers due to the influx of new workers or the redeployment of existing workers within the area;
- Indigenous education, training and employment initiatives
- recruitment of people from disadvantaged groups; and
- to the extent that information is available, include cumulative effects of other major employers in the area and their likely recruitment schedules.

Describe likely lay-off schedules and how reductions in the workforce at various stages will impact on employment patterns in the social and cultural area of influence. To the extent that information is available, include the cumulative effects of other major employers in the area and their likely lay-off schedules.

Describe the training opportunities to be provided during the various phases of the project, particularly for indigenous people, or people from disadvantaged groups, and describe the provisions to be made for apprenticeship and worker training schemes.

Describe where staff and their immediate families are likely to reside during the construction and operational phases, and assess the likely impacts on housing availability and affordability, including:

- the likely changes to residential patterns in the social and cultural area of influence during all stages of the project;
- the effects of the commuting model, e.g. FIFO and/or DIDO versus local residency;
- locations, size and type of any workers camps;
- purchase of existing housing for mine staff;
- changes to residential occupation patterns, e.g. families versus house sharing by groups of singles;
- construction of new family housing;
- availability of existing housing for purchase and rent, and the capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the project;
- effects on property values and rents;
- effects on property marketability;
- the potential displacement of existing residents who may no longer be able to afford accommodation; and
- impacts of the project on the availability of low cost housing within the social and cultural area of influence (e.g. assess whether pressure on rents would create a need for a local authority to build low cost housing for those in the community who would not benefit economically from the project).

The assessment should address not only the impacts on residential issues due to the accommodation of workers directly employed by the project, but also those due to the numbers of contractors and service providers that may be attracted by the opportunities offered by the project. The EIS should assess the impacts arising from alternative options for accommodation and develop a preferred accommodation strategy. Identify

any approvals needed for the preferred option for new worker camps or housing, and cross-reference to those sections of the EIS that assess the potential impacts of new camps or housing.

The EIS should assess, for the various stages of the project, the demand for community services and the likely impacts on social infrastructure provided by local, State and Federal governments. The assessment should provide sufficient information for affected government authorities to make informed decisions about how the proposal may affect their business and enable them to plan for the continuing provision of social infrastructure including health, education, community services, recreational activities and other services in the region.

Assess the likely cultural pressures and shifts both for indigenous and non-indigenous cultural groups. Particular attention should be paid to the effects on:

- likely changes to cultural identities in the social and cultural area of influence;
- the ability of both indigenous and non-indigenous people, to live in accordance with their own values and priorities; and
- the use of, and access to, culturally important areas and landscapes.

The EIS should assess the likely impacts on lifestyle and amenity in the social and cultural area of influence, including:

- effects on families (and the demand for family support services) of parents being absent while on-roster;
- changes to perceptions of safety and community in the established population;
- changes to health and social wellbeing of families and communities including household consumption patterns; social dysfunction including alcohol and drugs, crime, violence, and social or cultural disruption due to population influx.
- impacts on amenity of any changes in household composition patterns, such as sharing singles replacing families in residential areas, increased noise from social activities, and contractors parking commercial vehicles and machinery in residential areas.

Describe likely effects on the prevalence of crimes against the person and against property in the social and cultural area of influence based on evidence of equivalent social changes elsewhere.

Assess the likely adverse and beneficial social impacts of the project on local and regional service industries and the families that depend in whole or part on the income that comes from those service industries (the financial effects should be discussed in the Economy section of the EIS).

Describe the implications of the proposal for future developments in the social and cultural area of influence including constraints on surrounding land uses.

The EIS should summarise the net adverse or beneficial social impacts of the proposed project with an estimation of the overall significance of those impacts.

For identified social impacts, social impact mitigation strategies and measures should be presented to address:

- the demographic changes in the profile of the social and cultural area of influence;
- the recruitment and training of the construction and operational workforces and the social and cultural implications this may have for the host community;
- housing and accommodation issues, in consultation with relevant local authorities and state government agencies, with proposals for accommodating the project workforce and their families that avoid, mitigate or offset any short and medium term adverse effects on housing affordability and availability, including the rental market, in the social and cultural area;
- capacity of current social infrastructure, particularly health and welfare, education, policing and emergency services; and
- the adequate provision of education, training and employment for all groups, including women, people with a disability, and Indigenous people.

The proponent should describe any consultation with government agencies and the communities regarding the acceptability of proposed mitigation strategies and the implementation of practical management and monitoring

regimes. The EIS should clearly indicate whether any nominated party other than the proponent accepts responsibility for implementing the measure(s).

A draft social impact management plan should be presented that promotes an active and ongoing role for impacted communities, local authorities and government agencies through the project life cycle from planning, construction, operations and decommissioning. The draft plan should cover:

- action plans for the implementation of mitigation strategies and measures;
- assignment of accountability and resources;
- reporting mechanism for activities and commitments;
- mechanisms to respond to public enquiries and complaints;
- mechanisms to resolve disputes with stakeholders;
- periodic evaluation of the effectiveness of community engagement processes; and
- practical mechanisms to monitor and adjust mitigation strategies and action plans to achieve best outcomes.

4.11 Health and safety

4.11.1 Description of environmental values

This section will describe the existing community values for public health and safety that may be affected by the MEP. For projects proposing air emissions, and/or those with the potential to emit odours, nearby and other potentially affected populations will be identified and described. Particular attention will be paid to those sections of the population, such as children and the elderly that are especially sensitive to environmental health factors.

4.11.2 Potential impacts and mitigation measures

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

The EIS will assess the effects on the MEP workforce of occupational health and safety risks and the impacts on the community in terms of health, safety, and quality of life from project operations and emissions. Any impacts on the health and safety of the community, workforce, suppliers and other stakeholders will be detailed in terms of health, safety, quality of life from factors such as air emissions, odour, dust and noise.

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

The EIS will address the MEP's potential for providing disease vectors. Measures to control mosquito and biting midge breeding will be described. Any use of recycled water will be assessed for its potential to cause infection by the transmission of bacteria and/or viruses by contact, dispersion of aerosols, and ingestion (e.g. via use on food crops). Similarly, the use of recycled water will 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 will also be recommended in this section.

4.12 Economy

4.12.1 Description of environmental values

This section will describe the existing economic environment that may be affected by the MEP. The character and basis of the local and regional economies will be described including:

- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc); and

- historical descriptions of large-scale resource developments and their effects in the region.

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

4.12.2 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.

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

At a level of detail appropriate to the scale of the MEP, the analysis is to consider:

- the significance of this proposal on the local and regional economic context;
- the long and short-term beneficial (e.g. job creation) and adverse (e.g. competition with local small business) impacts that are likely to result from the development;
- the potential, if any, for direct equity investment in the MEP by local businesses or communities;
- the cost to all levels of government of any additional infrastructure provision;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);
- the potential economic impact of any major hazard identified in section 4.12 Economy;
- the distributional effects of the MEP including proposals to mitigate any negative impact on disadvantaged groups;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

Consideration of the impacts of the MEP in relation to energy self-sufficiency, security of supply and balance of payments benefits may be discussed. Attention will be directed to the long and short-term effects of the MEP on the land-use of the surrounding area and existing industries, regional income and employment and the state economy.

For identified impacts to economic values, appropriate mitigation and enhancement strategies will be proposed.

4.13 Hazard and risk

This section of the EIS will describe the potential hazards and risk to people and property that may be associated with the MEP as distinct from hazards and risk to the natural environment, which will be addressed in the other sections of the TOR.

4.13.1 Description of environmental values

Detail the values related to people and property that could be affected by any hazardous materials and actions incorporated in the proposal.

4.13.2 Potential impacts and mitigation measures

This section of the EIS will describe the potential hazard and risk that may be associated with the MEP, including consideration of both natural and man-made hazards. This section will also define and describe 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.

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 MEP on sensitive areas and resources such as

forests, water reserves, State and local Government controlled roads, places of residence and work, and recreational areas. The degree and sensitivity of risk will be described.

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

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

Details will 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 will develop an integrated risk management plan for the whole of the life of the MEP including construction, operation and decommissioning phases. The plan will include a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis. The assessment will outline the implications for and the impact on the surrounding land uses, and will involve consultation with Department of Community Safety, including regional representatives from the Queensland Fire and Rescue Service, Emergency Management Queensland and the Queensland Ambulance Service. The preliminary hazard analysis will 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;
- life of any identified hazards;
- a list of all hazardous substances to be used, stored, processed, produced or transported;
- the rate of usage;
- description of processes, type of the machinery and equipment used;
- potential wildlife hazards such as crocodiles, snakes, and disease vectors; and
- public liability of the State for private infrastructure and visitors on public land.

The integrated risk management plan will include the following components:

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

4.14 Cross-reference with the terms of reference

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

5 Environmental management plan

The environmental management plan (EM plan) will be developed from the mitigation measures detailed in part 4 of the EIS. Its purpose is to set out the proponents' environmental protection commitments in a way that allows them to be measured and audited.

The EM plan is an integral part of the EIS, but will be capable of being read as a stand-alone document without reference to other parts of the EIS. For a mining project the EM plan must meet the content requirements of section 203 of the *Environmental Protection Act 1994*. The general contents of the EM plan will comprise:

- the environmental values likely to be affected by the mining activities;
- the potential adverse and beneficial impacts of the mining activities on the environmental values;
- the proponents' commitments to acceptable levels of environmental performance, including environmental objectives, i.e. levels of expected environmental harm, performance standards and associated measurable indicators, performance monitoring and reporting;
- impact prevention or mitigation actions to implement the commitments; and
- corrective actions to rectify any deviation from performance standards.

Through the EM plan, the EIS's commitments to environmental performance can be used to develop regulatory controls as conditions to apply to project approvals Therefore, the EM plan is a relevant document for project approvals, environmental authorities and permits, and may be referenced by them. The EM plan may suggest conditions that will form the basis for developing the draft environmental authority.

6 Commitments not included in the EM plan

This section of the EIS should summarise any commitments made by the proponent that are not included in the EM plan (such as a commitment to assist a local council mitigate social impacts). It should be clear how and when the commitments will be fulfilled.

7 References

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

8 Recommended appendices

A1. Final terms of reference for this EIS

A copy of the final TOR will be included in the EIS. Where it is intended to bind appendices in a separate volume from the main body of the EIS, the TOR at least will be bound with the main body of the EIS for ease of cross-referencing. A summary, cross-referencing specific items of the TOR to the relevant section of the EIS, will be provided in section 4.14 of the EIS.

A2. Approvals

A list of the approvals required by the MEP will be presented.

A3. Study team

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

A4. The standard criteria

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

A5. Consultation report

The summary Consultation Report appendix for an EIS under the *Environmental Protection Act 1994* will commence by including the details of affected and interested persons, and the statement of planned consultation with those persons, originally provided with the draft terms of reference. It will describe how 'interested' and 'affected persons,' and any 'affected parties' as defined in the *EPBC Act*, were identified.

A further list will be provided that includes the Commonwealth, state and local government agencies consulted, and the individuals and groups of stakeholders consulted.

The Consultation Report appendix will summarise the results of the community consultation program, providing a summary of the groups and individuals consulted, the issues raised, and the means by which the issues were addressed. The discussion will include the methodology used in the community consultation program including criteria for identifying stakeholders and the communication methods used.

A6. Specialist studies

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

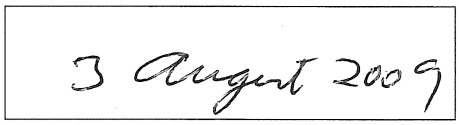
- geology;
- soil survey and land suitability studies;
- air and greenhouse gas;
- noise and vibration studies;
- surface hydrology and groundwater studies;
- ecology studies;
- social and economic studies, and cost benefit analysis; and
- hazard and risk studies.

A7. Research

Any proposals for researching alternative environmental management strategies or for obtaining any further necessary information will be outlined in an appendix.

Approved By

Signature



Date

Director, Assessment Branch
Environmental Services Division, DERM
160 Ann Street, Brisbane, Q 4000

Enquiries:
Assessment Branch
Ph. 07 3225 1545
Fax. 07 3227 7720