Terms of Reference for the proposed Roseby Copper project

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

Executive summary

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 environmental impact statement (EIS), and focus strongly on the key issues and conclusions.

Glossary of terms

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

1.0 Introduction

1.1 Project proponent

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

1.2 Project description

Provide a brief description of the key elements of the project. Any major associated infrastructure requirements should also be summarised. Detailed descriptions of the project should follow in section 3. Describe and map the location of the project and its infrastructure requirements.

Provide a brief description of studies or surveys which have been undertaken for the purposes of developing the project and preparing the EIS. This should include reference to relevant baseline studies or investigations undertaken previously.

1.3 Project objectives and scope

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

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

1.4 The environmental impact assessment (EIA) process

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

1.4.1 Methodology of the EIA

This section should provide a description of the EIA process steps, timing and decisions to be made for relevant stages of the project. This section should also indicate how the consultation process (which will be described in detail in section 1.5) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation. The information in this section is required to ensure:

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

1.4.2 Objectives of the EIS

Having described the EIA process, a succinct statement should be made of the objectives of the EIS. The structure of the EIS can then be outlined as an explanation of how the EIS will meet its objectives. In brief, the purpose of the EIS is to provide public information on the need for and likely effects of the project, 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 is a key aspect of the EIS.

Outline the role and purpose of the EIS. While the terms of reference provide guidance on the scope of the EIS studies, they should not be seen as exhaustive or limiting. If it transpires during the preparation of the EIS that currently unforeseen matters not addressed in the terms of reference are found to be relevant to the assessment of impacts of the proposal, those matters should be included in the EIS. The audience should be able to distinguish the EIS as the key environmental document providing advice to decision-makers considering approvals for the project. The role of the EIS in providing the mining project's Environmental Management Plan (EM Plan) for ongoing regulation should also be discussed.

1.4.3 Submissions

This section should set out how public submissions on the draft EIS will be addressed and taken into account in the decision-making process.

1.5 Public consultation process

Develop an appropriate public consultation program to the satisfaction of the Queensland Environmental Protection Agency (QEPA). This section should outline the methodology that was adopted to identify and mitigate socio-economic impacts that may arise from the project. Information about the consultation that has taken place and the results of such consultation should 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.* Consultation should be held with affected and adjacent landholders and land users to determine road and service access requirements/agreements. Appendix A4 should contain a Consultation Report containing this information.

The public consultation program should include meetings with interest groups and stakeholders including local landholders, government agencies and Indigenous stakeholders and the production of regular summary information and updates, and other consultation mechanisms.

The public consultation process should identify broad issues of concern to the local community and interest groups and should continue throughout the life of the project, from project planning through commissioning, project operations and final rehabilitation.

Reference should be made to the Department of Natural Resources and Mines (DNRM) Technical Guideline on Community Consultation 1995 and QEPA Guideline 7 - Issue Identification and Community Consultation.

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

This section should explain the legislation and regulations controlling the approvals process. Reference should be made to State legislation (and associated regulations) such as, but not limited to, the:

- *EP Act 1994;*
- *Queensland Mineral Resources Act 1989 (QMR Act 1989);*
- *Nature Conservation Act 1992 (NC Act 1992);*
- *Water Act 2000;*
- *Aboriginal and Cultural Heritage Act 2003;*
- *Queensland Heritage Act 1992;*
- *Native Title Act 1993 (Cwlth);*
- *Transport Infrastructure Act 1994; and*

- *Fisheries Act 1994.*

Any requirements of the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) should also be included.

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

In addition, necessary approvals for the proposed project should be identified. Consideration of the project's consistency with the legislation, standards, codes or guidelines available to monitor and control operations on site should be given. A list of the approvals required for the project and the expected program for approval of applications should be provided. Where applicable the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* should be referred to.

1.6.2 Planning processes and standards

This section should discuss the project's consistency with existing land uses or long-term policy framework for the area (for example, as reflected in local and regional plans), and with legislation, planning policies, standards, codes or guidelines available to monitor and control operations on site. This information is required to demonstrate how the project conforms to State, regional and local plans for the area.

1.7 Accredited process for controlled actions under commonwealth legislation

The Roseby Copper project is unlikely to impact on matters of National Environmental Significance and has not been referred to the Department of Environment and Heritage.

Consequently, the Queensland EIS process will not be accredited for the assessment of the project under Part 8 of the *Environment Protection and Biodiversity Conservation Act 1999*. In the unlikely event that at a later date it is found necessary to refer the project to the Commonwealth and it is declared a controlled action, impacts on matters of National Environmental Significance will be assessed under a separate process.

The EIS will include a statement to discuss the accredited process for controlled actions under Commonwealth legislation.

2. Project need and alternatives

2.1 Project justification

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

The status of the project should be discussed in a regional, State and national context.

2.2 Alternatives to the project

Describe feasible alternatives, including conceptual and technological alternatives to the proposed project including discussion of the consequences of not proceeding with the project. Alternatives should be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others. Reasons for selecting the preferred options should be delineated in terms of technical, commercial, social and natural environment aspects. In particular, the principals of ESD and sustainable development should be included. Comparative environmental impacts of each alternative should be summarised.

The options and the reason for preferring particular options over others can be discussed in more detail in sections 3 and 4, particularly if the reasons are on environmental grounds.

Explain the interdependencies of the project components, particularly in regard to how any infrastructure requirements relate to the viability of the project. This section should include a description of and rationale for water supply and/or storage infrastructure for the project.

The relationship of options chosen for waste management and any emissions produced should be detailed.

3. Description of the project

The objective of this section is to describe the project through its lifetime of construction, operation and decommissioning. This information is required to allow assessment of all aspects of the life of the project, including all phases of the project from planning, construction, and operation to decommissioning. It also allows further assessment of which approvals may be required and how they may be managed through the life of the project. Note that in describing the project area, the surrounding environment, particularly downstream and downwind of the project should be included.

3.1 Location and general description

Provide a description and map of the proposed project location in relation to major towns, sensitive places, residences and existing infrastructure. Present land uses in the areas should be discussed. Provide a general description of the project's proposed major components and infrastructure.

An aerial photo and/or topographic map should be included to illustrate components of the project in relation to natural features of the area such as ranges, watercourses, and environmentally significant vegetation. This section should also describe the major natural features of the project area, including groundwater aquifers and major flood levels. In addition, maps (at suitable scales) should be provided showing the exact location of the project area including:

- The location of the resource to be explored, developed or mined;
- The location and boundaries of mining tenures, granted or proposed, to which the project area is or will be subject;
- The location of waterways defined as watercourses by the Department of Natural Resources and Mines;
- The location of any retention/treatment ponds, discharge points or surface water diversions (if required);
- The location of any transport corridors such as roads, power lines and pipelines;
- The location of pastoral and other tenures;
- The location and boundaries of the plant site, officers, workshops and infrastructure; and
- The location of noise, vibration and odour sensitive places

The rationale for the choice of location (positioning) of the various project components should be described in terms of minimising environmental harm. This should include minimising environmental harm on surface waters, groundwater, sensitive places, and flood prone areas. In addition this section should briefly describe the measures to be taken to ensure potential minable mineral deposits are not sterilized by any component of the project.

3.1.1 Regional context

The regional context of the proposal should be described and illustrated on maps at suitable scales.

3.1.1 Local context

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

3.2 Exploration and mineral development

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

3.3 Construction

Describe the extent and nature of the project's construction phase. The description should include the type and methods of construction to be employed, the construction equipment to be used and the items of the plant to be transported onto the construction site. Any staging of the construction phase should be described and illustrated showing site boundaries, development sequencing and timeframes.

The estimated numbers of persons to be employed during the project construction phase should also be given.

3.4 Mine operations

Briefly describe the measures to be taken to ensure that resource extraction is optimised.

The location of the proposed open-cut pits should be illustrated on maps and described, including probable mining pit boundaries, mine path and the mine development sequence or timeframes and the potential for final voids to be left at the cessation of mining or for final voids to be backfilled. The rationale for the preferred operational program should be explained. In particular, discuss the following:

- Approximate areas to be disturbed at each stage of the project, including extent of excavations and location of waste rock dumps (hectares (ha));
- The approximate quantity of material to be mined and process to be employed;
- The equipment to be employed in the mining operations;
- The approximate depth of open-pit operations and likelihood of intercepting groundwater. If groundwater is likely to be intercepted, the expected quality/quantity and dewatering strategy including if the water will be used for processing or other feasible uses or disposal options;
- The potential for voids to remain post mining or the backfilling of voids;
- A brief overview of waste rock management as this will be discussed in more detail in section 3.8.2; and
- A brief overview of topsoil stripping and stockpiling from areas to be disturbed as this will be discussed in more detail in section 4.1.2.2.

3.4.1 Location and tenure

Maps at suitable scales should be provided showing the precise location of the project area, and in particular:

- The location and boundaries of land tenures, in place or proposed, to which the project area is or will be subject;
- The location and boundaries of the project 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.

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

3.4.2 Mine life and resource base

Specific details should be provided of the following:

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

3.4.3 Mining methods and equipment

Specific details should be provided of the following:

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

The description should refer to, and be complemented by, the figures previously presented in section 3.4.1 showing the locations of key aspects of the project. Additional figures should be provided if required.

3.4.4 Mine sequencing

Specific details should be provided of the following:

- The proposed sequence and approximate timing of mining of each ore body within the mining lease;
- The physical extent of excavations, location of stockpiles of waste rock to be handled during the project's operation or left after mining ceases—the description should include the rate of throughput of stockpiles of product, reject and overburden;
- Progressive backfilling of excavations (if to be conducted); and
- The approximate area disturbed at each major stage of the project.

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

3.5 Processing activities

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

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

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

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

3.6 Product handling

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

3.7 Infrastructure requirements

This section should provide descriptions, with concept and layout plans, of requirements for constructing, upgrading or relocating all infrastructures in the vicinity of the project area. The matters to be considered include such infrastructure as roads, rail, bridges, tracks and pathways, dams and weirs, bore fields, power lines and other cables, wireless technology (for example, microwave telecommunications), and pipelines for any services (whether underground or above).

3.7.1 Transport

Describe the arrangements for the transport of plant, equipment, ore, products, wastes and personnel during both the construction phase and operational phases of the project.

Provide details of the proposed use of road and rail for transport of materials, waste and products to or from the project site.

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

- The volume, composition (types and quantities), origin and destination of goods to be moved including construction materials, plant, raw materials, waste products, hazardous materials and finished products;
- The volume of traffic generated by workforce personnel, visitors and service vehicles;
- Changes of traffic generation over the life of mine;
- Method of movement (including vehicle types and number of vehicles likely to be used);
- Anticipated times at which movements may occur;
- Details of vehicle traffic and transport of heavy and oversize indivisible loads (including types and composition);
- The proposed transport routes;
- Need for increased road maintenance and upgrading;
- Details on any new roads, any new mine access to the Burke Development Road, road realignments or proposed road closures required as a result of the project; and
- The suitability of the current access roads and infrastructure (that is, bridges) for the intended volumes and vehicle sizes.

Consultation with the Department of Main Roads will be conducted on access to and use of the Burke Development Road.

3.7.2 Energy

Detail the requirements for connection to the electricity transmission line or an on-site diesel power station in this section. Provide the electricity supply requirements for the construction and operation of the project. The location of the on site power station or transmission line should be detailed on an infrastructure plan. The assessment of environmental impacts of the transmission line (if required) should be dealt with outside of the EIS by the provider of electricity.

The use of renewable energy and the assessment of options for renewable energy under Commonwealth rebate programs should be considered.

3.7.3 Water supply and storage

Provide information on water usage and storage by the project, including the quality and quantity of all water supplied to the mine and processing plant. In particular, the proposed and optional sources of water supply, transport and storage arrangements should be described (for example, bores, mine water, any surface storages such as dams and weirs, municipal water supply pipelines, etc.) The volumes required from these different sources and frequency of supply where relevant should also be detailed. Comment on the relationship between the project's proposed water sources and the provisions of the Gulf Draft Water Resource Plan and associated Moratorium

A water balance for the mining project and processing plant is required to account for the estimated usage of water. Estimated rates of supply from each source should be given. Describe the potential for water reuse and recycling on the project to reduce raw water use.

Determine the potable water demand for the project, including the temporary demands during the construction period. Describe the water storage and treatment for use by the site workforce.

This section will describe the water monitoring program that will be implemented for potable water on the project with reference to the Australian Drinking Water Guidelines.

3.7.4 Stormwater drainage

Provide a description and map of the proposed mine and processing plant stormwater drainage system and the proposed disposal arrangements, including any off-site discharge points. This should include the consideration of placement of waste rock dumps and tailing storage and/or disposal site(s) with relation to natural drainage lines. The need for and design of sediment control structures downstream of disturbance areas and strategies for diverting clean water away from disturbed or contaminated areas should be described.

If stream diversions are necessary on the project, then design and construction of these diversions should be discussed in this section. This should include the final streambed design, the volumes of water to be diverted and the proposed drainage pathways.

If roads, pipelines or other infrastructure are proposed to cross-waterways on the project then this infrastructure and its design should be discussed in this section.

3.7.5 Sewerage

Provide volume estimates of domestic effluent that will be produced and the proposed method of disposal.

If the method of sewage treatment has not been decided, this section should describe all options, while the potential impacts of those options and associated mitigation measures should be addressed in section 4. Details of the proposed sewage treatment systems should include:

- A description of the treatment process with a process flow sheet showing waste streams and the method of waste disposal;
- The capacity of the treatment and disposal system;
- A scale location plan which shows proposed discharge points in relation to:

- potentially impacted waters (including rivers, creeks, drains, groundwater bores and water courses); and

- potentially impacted neighbours, sensitive areas and their distance from the site.

3.7.6 Telecommunications

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

3.7.7 Accommodation and other infrastructure

A description should be provided of any other developments directly related to the project not previously described, including the following:

- camps;
- fuel storage areas;
- equipment maintenance areas;
- laboratories; and
- site offices.

3.8 Waste management

3.8.1 Character and quantities of waste materials

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

- tonnage of raw materials processed;
- amount of resulting process wastes; and
- 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 3.4, should be provided for each distinct stage of the project (for example, construction/site preparation, commissioning, operation and decommissioning) indicating the processes to be used and highlighting their associated waste streams (that is, all waste outputs: solid, liquid and gaseous), including recycling efforts, such as stockpiling and reusing topsoil. The schematic diagrams, or an associated table, should cross-reference the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described. The physical and chemical characteristics of waste material from the process plant should be provided.

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

Should the Proponent propose anode or cathode production then wastes from these processes should be characterised and waste management and disposal of these wastes described in this section.

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

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

3.8.2 Waste rock disposal

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

- An estimated tonnage and/or volume of waste rock to be produced annually and during the life of the project;
- Details of methodology and results of waste rock characterisation that includes the potential quantity, variability and net acid producing potential of the mined waste rock material through static testing (metals analysis, sulphides, pH, conductivity, net acid generation (NAG) and acid neutralising capacity (ANC), etc), and tests that show likely outcomes under field conditions for example, kinetic testing where waste rocks are likely to generate acid. Sampling should be representative with profiles of all geological units included and based on accepted statistical procedures. The sampling regime and testing methodology to be used should take into account recognised guidelines such as those issued by Environment Australia (1997)[1] and the USEPA (1992)[2] to demonstrate confidence in characterisation data for each geological unit;
- Details of any likely leachate quality expected under field conditions, including contaminants such as sulphate, pH, chloride, iron and other non-metallic and metallic ions;
- Evaluation of various methods of waste rock disposal including the design details for those methods such as treatment, materials blending (or mixing or co-disposal with tailings) capping, lining, encapsulation, and configuration and justification for chosen method(s);
- The timing of the generation of different waste types and their placement;
- Measures to ensure stability (both geotechnical and hydrological) of the waste rock dumps; and
- Slope profiles that are consistent with intended land use and acceptable post mine land management and maintenance.

3.8.3 Tailings disposal

Describe alternative options for tailings disposal including the proposed location, site suitability, dimensions, design and volume of any tailings storage and/or disposal site(s), including the method of construction.

Describe the approximate quantity of tailings that will be produced by the project annually and for the life of the mine. Tailings characterisation information should also be presented in this section including any characteristics of the tailings that may be likely to affect the long-term land use of the tailings storage and/or disposal site(s). Such characteristics should include:

- Physical properties of the tailings solids (including specific gravity, solids settling characteristics, mineralogy and general geotechnical properties);
- Geochemical properties of tailings solids using static testing (for example, ANC, net acid production potential (NAPP), NAG etc.), and kinetic testing where necessary; and
- Chemical properties of tailings liquor (that is, basic chemical parameters including pH, conductivity, non-metallic and metallic ions).

[1] Environment Australia 1997 Managing Sulphidic Mine Wastes and Acid Drainage Best Practice Environmental Management in Mining

[2] US Environmental Protection Agency 1994 Acid Mine Drainage Prediction, Technical Document

The significant part of this discussion should be the description of a tailings management strategy for the project, outlining the significant components of the strategy, including tailings storage and/or disposal site(s). Consideration of disposal into voids should be given and discussed. Describe the timing and staging for development of each tailing storage and/or disposal site to accommodate the life-of-mine tailings production. This should cover significant construction phase activities and the key aspects of the system operation, including tailings deposition scheduling, management, and opportunities for progressive rehabilitation.

The construction of tailing storage and/or disposal site(s) walls should be described with regards to construction materials and design. Describe the strategies to manage seepage from the tailing storage to prevent any discharge from site taking into account hydraulic conductivity and fractured rock in the location. Describe appropriate monitoring strategies to detect seepage.

Consideration should be given to bunding of tailings pipelines for potential spillage containment.

Justification should be provided for the selection of preferred storage and/or disposal site(s) based on the geological, physical and environmental setting of each site. The location, layout, significant features and environmentally sensitive areas of each site should be discussed. This should also take into account the relevant characteristics of the tailings and any economic restrictions to locating the storage and/or disposal site(s).

The location of the storage and/or disposal site(s) with regard to adjacent creeks and rivers should be described.

3.8.4 Liquid waste

Present a description of the expected origin, quantity and quality of wastewater originating from the project. Attention should be given to the capacity of wastes to generate toxic, acid, saline and/or sodic waste water. The EIS will need to consider wastewater from the following areas and their method of disposal, treatment or reuse:

- groundwater dewatered from open cut pits;
- rainfall directly onto disturbed surface areas;
- tailing storage site(s) return water;
- runoff from process plant areas and chemical storage areas; and
- drainage (that is, runoff plus any seepage) from waste rock dumps, stockpiles and the tailing storage and/or disposal site(s).

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

3.8.5 Air emissions

Describe all air emissions, including dust, gaseous emissions and odours from the project during construction and operation.

Should the option of copper anode production be determined feasible by utilising a copper anode casting furnace, then this section should discuss the potential air emissions from this process.

3.9 Rehabilitation and decommissioning

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the proposal. In particular, options for geotechnically and hydrologically stable landform designs, self sustaining vegetation covers and sustainable land use options at the end of mine life, will be described. Justification of the need for and use of final voids will be described. The strategic approach to progressive and final rehabilitation should be described. A preferred rehabilitation strategy should be developed with a view to minimising the amount of land disturbed at any one time. The final topography of any

excavations, waste areas and dam sites should be shown on maps at a suitable scale. The proposed final land uses including approximate areas, locations and details of rehabilitation success criteria to be used in monitoring rehabilitation shall be detailed. Post-mining land suitability and/or capability of the various land uses shall also be described

The strategies and methods presented for selective material handling and landform construction, progressive and final rehabilitation of disturbed areas should demonstrate compliance with agreed rehabilitation criteria. Land suitability assessment should follow the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (1995). In particular, the strategies and methods should have the following objectives:

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

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

Where dams are to be constructed, proposals for the management of these structures after the completion of the project should be given. The final drainage of the site, seepage control systems and long-term monitoring plans should be described.

Proposals to divert creeks during operations, and, if applicable, for the reinstatement of the creeks after operations have ceased, should be provided.

A description of selective overburden/waste rock material handling requirements necessary to ensure construction of rehabilitated landform soil profiles with desirable physical and chemical properties should be presented.

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

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

4. Environmental values and management of impacts

The functions of this section are:

- To describe the existing environmental values of the area which may be affected by the proposal. 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. Environmental values may also be derived following recognised procedures, such as described in the ANZECC 2000 guidelines. Environmental values should be described by reference to background information and studies, which should be included as appendices to the EIS.

- To describe the potential adverse and beneficial impacts of the project on the identified environmental values. Any likely environmental harm on the environmental values should be described. Include analysis of any cumulative impacts on environmental values caused by the project;

- To present environmental protection objectives and the standards and measurable indicators to be achieved; and

- To examine viable alternative strategies for managing impacts. These alternatives should 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 should be discussed.

This section should detail the environmental protection measures incorporated in the planning, construction, operations, decommissioning, rehabilitation and associated works for the project. Measures should minimise environmental harm and maximise socio-economic and environmental benefits of the project. Preferred measures should be identified and described in more detail than alternatives.

Environmental protection objectives may be derived from legislative and planning requirements which apply to the project including Commonwealth strategies, State planning policies, local authority strategic plans, environmental protection policies under the EP Act, and any catchment management plans prepared by local water boards or land care groups. Special attention should 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 project impact. Sensitive areas include those areas listed in Appendix A, Code of Environmental Compliance for Mining Lease Projects, Queensland Government.

This section should address all elements of the environment, (such as land, water, coast, 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 should be considered for each environmental value relevant to the project:

Environmental values affected: describe the existing environmental values of the area to be affected including values and areas that may be affected by any cumulative impacts. (Refer to any background studies in appendices. Any background studies will be conducted over the range of seasons, particularly during and following a wet season, to account for the ephemeral nature of watercourses traversing the proposal area, and seasonal variation in fauna and flora populations.)

Impact on environmental values: describe quantitatively the likely impact of the project on the identified environmental values of the area. The cumulative impacts of the project must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of the relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans should be addressed.

Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial and aquatic ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the project and other proposals competing for use of the local air and water sheds.

Consultative arrangements with other industries in the project area to undertake co-operative monitoring and/or management of environmental parameters are recommended.

Environmental protection objectives: describe qualitatively and quantitatively the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). 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 should 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.

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 for example, continuous improvement framework including details of corrective action options, reporting (including any public reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment.

Information quality: information given under each element should also state the sources of the information, how recent the information is, how any background studies were undertaken (for example, intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

The mitigation measures, monitoring programs, etc., identified in this section of the EIS should be used to develop the environmental management plan (EM Plan) for the project (see section 5).

4.1 Land

4.1.1 Description of environmental values

4.1.1.1 Topography

Provide detail of the contour information for the project site at suitable increments, with levels shown with respect to Australian Height Datum (AHD). Describe and map at an appropriate scale the proposed site in relation to the catchment systems and any waterways on or near the site.

4.1.1.2 Geology

Provide a description, map and a series of cross-sections of the geology of the project 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. Describe properties which may influence stability, occupational health and safety, rehabilitation programs, or the quality of wastewater leaving any area disturbed by the project.

Consider the possibility that fossil specimens may be located during construction or operations and propose strategies for recovering such specimens, if possible.

4.1.1.3 Mineral resources

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

The location, tonnage and quality of the mineral resources within the project area should be described in detail as indicated below. The mineral resources should be estimated and reported in accordance with the

'Australasian Code for Reporting of Mineral Resources and Ore Reserves' (the JORC Code - available at www.jorc.org/main.php).

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

- location and areal extent of the mineral resources to be developed or mined;
- location and boundaries of mining tenures, granted or proposed, to which the project area is, or will be subject;
- location of the proposed mine excavation(s);
- location and boundaries of any project sites;
- location and boundaries of any other features that will result from the proposed mining including waste/spoil dumps, water storage facilities and other infrastructure;
- location of any proposed buffers, surrounding the working areas; and (see section 4.1.4 Tenure in draft ToR); 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.

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

4.1.1.4 Soils

Conduct a soil profile survey of the project site affected by the proposed mining activity at a suitable scale, with particular reference to the physical and chemical properties of the materials that will influence erosion potential, stormwater runoff quality, land form design and stability, selective material handling, vegetation establishment and rehabilitation completion criteria. Soil profiles should be mapped at a suitable scale and described according to the *Australian Soil and Land Survey Field Handbook* (McDonald et al, 1990) and *Australian Soil Classification* (Isbell, 1996). An appraisal of the depth and quality of useable soil should be undertaken. Information should be presented according to the standards required in the Planning Guidelines*: The Identification of Good Quality Agricultural Land* (Department of Primary Industry, 1993), and the State Planning Policy 1/92: *Development and the Conservation of Agricultural Land*.

4.1.1.5 Tenure and land use

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

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

Describe the land use suitabilities of the affected area in terms of the physical and economic attributes. The potential environmental harm caused by the proposal on the adjacent areas currently used for agriculture, urban development, recreation, tourism, other business and the implications of the proposal for future developments in the impact area including constraints on surrounding land uses should be described. The assessment should

set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes. The limitations and land suitability classification system to be used 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, for example, for grazing of native and improved pastures and horticulture. Land classified as Good Quality Agricultural Land in the Department of Natural Resources' 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. Describe sustainability criteria for land uses appropriate for the existing undisturbed land.

4.1.1.6 Infrastructure

Show the location and owners or custodians of all tenures, reserves, roads and road reserves, railways and rail reserves, stock routes and the like, covering the affected land. Indicate locations of gas and water pipelines, power lines and any other easements. The proposed location of any new roads, rail or power lines should also be shown.

Show the location and include a description of any existing roads and/or service affected by the project that may require to be maintained, redirected or modified as per negotiations/agreements with landholders and/or affected persons.

Describe the environmental values affected by this infrastructure in particular any potential impacts on sensitive areas such as waterways and riparian areas, private property and the reasons for choosing the proposed route or location.

4.1.1.7 Sensitive environmental issues

Provide a map of and identify whether areas that are environmentally sensitive could be affected, directly and indirectly, by the project.

In particular, the EIS should indicate if the land affected by the project is or is likely to become part of the protected area estate, or is subject to any treaty. Consideration should be given to national parks, conservation parks, wilderness areas, heritage/historic areas or items, national estates, world heritage listings and sites covered by international treaties or agreements (for example, Ramsar, Japan Australian Migratory Bird Agreement (JAMBA), and China/Australia Migratory Bird Agreement (CAMBA)), areas of cultural significance and scientific reserves.

Identify the proximity of the project elements to any of these areas.

4.1.1.7.1 Scenic values

This section should describe in general terms the existing character of the landscape that will be affected by the proposal. It should comment on any changes that have already been made to the natural landscape since European settlement.

This section should 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 proposal 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 project site;

- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;

- identification of the areas of the proposal 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.

4.1.1.7.2 Lighting

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

- night operations/maintenance and effects of lighting on fauna; and

- changed habitat conditions for nocturnal fauna and associated impacts.

4.1.2 Potential impacts and mitigation measures

4.1.2.1 Land use suitability

Provide details of the potential for the construction and operation of the project to change existing and potential land uses of the project site and adjacent areas. Post-mining land-use options should be detailed including suitability of the area mined to be used for grazing, nature conservation or other feasible alternatives. Describe the impacts resulting from differences between pre-mining and post-mining land use suitability. The rationale for proposing the preferred final land uses should be provided. The factors favouring or limiting the establishment of those options should be given in the context of appropriate land use sustainability criteria, optimising the long-term stability of the site and minimising potential liabilities for long-term management.

Should the project (or part of the project) be returned to low-intensity grazing then water quality in voids, access to water storages and soil contaminants should be detailed. Should parts of the project not be suitable for low-intensity grazing following rehabilitation, then excluding stock from these areas should be considered.

Outline incompatible land uses, whether existing or potential, adjacent to all aspects of the project.

Describe any post-mining land-use constraints or potential environmental harm to land suitability that the project may cause.

If the project adjoins or potentially impacts on Good Quality Agricultural Land then an assessment of the potential for land use conflict will be required using the procedures set out in the planning guideline, The Identification of Good Quality Agricultural Land, which supports State Planning Policy 1/92.

4.1.2.2 Land disturbance

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

Details should be provided for rehabilitation of any voids remaining after mining including land use, void water quality, safety of access, stability of void walls and management post-mining. Should backfilling of mined out voids with waste rock be deemed an appropriate strategy then the following should be addressed:

- location of the voids to be backfilled;

- process for backfilling voids;

- standards of rehabilitation of the surface;
- details on the potential for subsidence of filled material; and
- potential impacts of filled voids on groundwater.

The means of decommissioning the project, in terms of the removal of plant, equipment, structures, foundations, footings, hardstand and buildings should be described. Present the methods proposed for the stabilisation of the affected areas. Information on rehabilitation and decommissioning objectives, strategies and success criteria for the following land disturbances should be detailed:

- Final voids;
- Waste rock dumps;
- Processing plant;
- Infrastructure such as access roads, haul roads, the mine camp, offices, workshops pipelines, storage areas;
- Watercourse diversions; and
- Tailings storage and disposal sites.

The different disturbance types on the project, the final land uses proposed for each, and analogue sites or other completion criteria proposed should be described using a table.

Describe the methods to be used on disturbed areas for landform construction, selective material handling, soil profile construction, covering, drainage, re-contouring, topsoil handling, revegetation, monitoring, and maintenance. Provide information on a list of possible plant species to be used in revegetation, including threatened species, and where practicable give consideration to reinstating similar habitat in disturbed areas. Erosion and sediment control and weed management during topsoil storage and replacement should be described.

Propose strategies for protecting significant fossil specimens that may be uncovered during construction/operations and alert Queensland Museum to the find.

Discuss the strategies for the use of analogue sites or other method to propose success and completion criteria. This should include how desired species composition, distribution and percentage cover criteria will be monitored and how achievement of the criteria will be assessed.

The final topography of any excavations, waste areas and final voids should be shown on maps at a suitable scale. Describe the final depth of excavations and design of waste dumps and tailing storage and/or disposal sites.

4.1.2.3 Land contamination

A Preliminary Site Investigation (PSI) of the site consistent with the QEPA's "Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, 1998" should be undertaken to determine background contamination levels. The following information should be presented in the EIS:

- Mapping of any areas listed on the Environmental Management Register or Contaminated Land Register under the EP Act 1994;
- Identification of any potentially contaminated sites not on the registers that may need remediation; and

- A description of the nature and extent of contamination at each site and a remediation plan and validation sampling.

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 1998 should be undertaken.

Describe the possible future contamination of land from aspects of the project including waste products such as waste rock and tailings. This should also include any potential spills at chemical, processing and fuel storage areas. Describe possible contamination of land by weeds and other organic matter.

The means of preventing land contamination (within the meaning of the EP Act) should be addressed. Outline methods proposed for preventing, recording, containing and remediation of any contaminated land during construction, operation and decommissioning. Intentions should be stated concerning the classification (in terms of the Queensland Contaminated Land Register) of land contamination on the project during decommissioning.

Final rehabilitation of the plant site, waste rock dumps and tailings storage and/or disposal sites should be discussed in terms of management of any residual contaminated land and any other land management and maintenance issues.

The potential nature and extent of post-mine liability in terms of contaminated land and land management and maintenance should be discussed.

4.1.2.4 Soil erosion

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

The report should include an assessment of likely erosion effects, both on-site and off-site, associated with all disturbed areas such as:

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

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

Methods used and release limits for suspended solids must be based on implementation of best practice erosion and sediment control guidelines, in particular, "*Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites."*

4.1.2.5 Visual amenity

Describe how the project may impact on the visual landscape character of the site and surrounding area and how they will be mitigated or avoided. The design of rehabilitated landforms in relation to scenic values should be discussed.

Discuss measures to reduce the visual impact of the proposed project in terms of the extent and significance of the changed skyline, as viewed from places of residence, work, recreation, public roads and other known vantage points, during all stages of the project as it relates to the surrounding landscape.

4.1.2.6 Transport

Provide sufficient information in the EIS to enable Queensland Rail (QR) and Queensland Transport (QT) to make an independent assessment of how the rail network (including infrastructure) will be affected. The outcome of discussions/agreements held with QR and Queensland Transport should be documented in this section (if available) with regards to the project's potential impacts on the rail network from Cloncurry to Townsville. Environmental impacts from increased rail traffic will be dealt with outside of this EIS process by QR's own environmental management processes through an Environmental Investigation and Risk Management Report.

Provide details of the potential impacts on environmental values of any new roads or road realignments.

This section should provide sufficient information and assessment of how the State-controlled and local government road networks will be potentially affected by the project. Include information on the probable impact of identified construction and operational traffic generated by the project with particular concern to impacts on existing road infrastructure, road users and road safety. Measures to be implemented to address identified impacts should be discussed. Other issues to be investigated include the potential impacts of the project on:

- Changes in traffic volumes and composition on the existing road network during construction and operation;
- Impact on the need and timing of road improvements such as road widening, realignment or strengthening;
- Changes in road maintenance requirements;
- New intersection requirements or special traffic facilities;
- Traffic movements at rail facilities; and
- Measures to be taken to address adverse impacts.

This section should also provide information on product spill contingency plans and the adequacy of equipment and facilities to deal with possible spills for the road transport routes of the project. This should include:

- An outline of measures to manage the containment, treatment and clean-up of spills within road reserves;
- Identification of future/continual remedial works which may be required in the road reserve should a spill occur; and
- Outline incident reporting measures to ensure that Emergency Services or Main Roads are contacted immediately in the event of a spill on a State-controlled road or within a State-controlled road reserve.

The proponent should use the Main Road's Guidelines for assessment of road impacts of development proposals which is available on the Main Roads' website: www.mainroads.qld.gov.au.

4.2 Climate

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

The potential impacts due to climatic factors should be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion should be addressed in section 4.1.2.4. The impacts of storm events on the capacity of waste containment systems (for example, site bunding/stormwater management and tailings dams) should be addressed in section 4.3.2 with regard to contamination of waterways and in section 4.5.2 with regard to the design of waste containment systems. The impacts of winds, rain, humidity and temperature inversions on air quality should be addressed in section 4.4.2.

4.3 Water

4.3.1 Description of environmental values

4.3.1.1 Surface waterways

A description should be given of the watercourses and their quality in the area affected by the project with an outline of the significance of these waters to the river catchment system in which they occur. Details provided should include a description of the existing surface drainage patterns and flows in major streams. 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 project. Flood studies should include a range of annual exceedance probabilities for affected waterways, where data permits.

An assessment is required of existing water quality in surface waters likely to be affected by the project. The basis for this assessment should be a monitoring program, with sampling stations located upstream and downstream of the project. Complementary stream-flow data should also be obtained from historical records (if available) to aid in interpretation.

The water quality data should be described including seasonal variations or variations with flow where applicable. A relevant range of physical and chemical parameters should be measured to gauge the environmental harm of the project on any affected watercourse. Parameters to be included in the monitoring program should be chosen in relation to potential contaminants from the project and may include:

- major ions including sulphate;
- metals and metalloids;
- pH; and
- conductivity.

The collection of background data to determine water quality trigger limits for the project should be conducted as proposed by the Australian and New Zealand Environment Conservation Council Guidelines for Fresh and Marine Water Quality 2000 (ANZECC Guidelines 2000) The determination of water quality trigger limits from background data should be based on a statistically correct method.

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

- Values identified from the *Environmental Protection (Water) Policy 1997* (EPP (Water)) and ANZECC Guidelines 2000;
- Physical integrity and morphology of waterways, including riparian zone vegetation and form;
- Present and potential water uses downstream of the areas affected by the project;
- Any water resource plans relevant to the affected catchment; and
- Sustainability, including both quality and quantity.

Discuss background stream sediment monitoring of watercourses potentially affected by the project in terms of the ANZECC Guidelines 2000 and/or background levels.

The stream sediment monitoring program and collection of background data should include analysis of relevant metals, metalloids and particle size. The collection of background data to determine sediment trigger limits for the project should be conducted as proposed by ANZECC Guidelines 2000, although with modification to allow for ephemeral systems. The determination of sediment trigger limits from background data should be based on statistically correct methods.

4.3.1.2 Groundwater

Review the quality, quantity and significance of groundwater in the project area, together with groundwater use in neighbouring areas. The review should include a survey of existing groundwater supply facilities (bores, wells or excavations, if relevant) to the extent of any environmental harm including:

- Location;
- Pumping parameters;
- Drawdown and recharge at normal pumping rates; and
- Seasonal variations of groundwater levels if they exist.

The nature and hydrology of the aquifers on the project site should be discussed, including:

- Host geology/stratigraphy – such as alluvium, volcanic, metamorphic;
- Aquifer type – such as confined, unconfined;
- Depth to and thickness of the aquifers;
- Depth to water level and seasonal changes in levels;
- Groundwater flow directions (defined from water level contours);
- Possible interaction with surface water;
- Possible sources of recharge; and
- Vulnerability to pollution.

The possible interaction with surface water will be assessed with respect to the draft Gulf Water Resources Plan.

The data obtained from the groundwater survey should be sufficient to enable specification of the major ionic species present in the groundwater, metals, as well as pH, electrical conductivity and total dissolved solids. The collection of background data to determine water quality trigger limits for the project should be conducted as proposed by ANZECC Guidelines 2000. The determination of water quality trigger limits from background data should be based on a statistically correct method.

Describe the groundwater environmental values in terms of:

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

4.3.2 Potential impacts and mitigation measures

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

The EIS should describe the possible environmental harm caused by the proposed project to environmental values for water as expressed in the EPP (Water).

The long-term stability of all structures on site in particular with reference to waste rock drainage and tailings seepage should be described. This includes the long-term prediction for the performance of the waste rock dumps and an investigation of leachate management and disposal options. Cross-reference the discussion of impacts with the waste streams identified in section 3.8.

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

Key water management strategy objectives include:

- Protection of important local aquifers and protection of their waters; and
- Maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota and the littoral zone).

4.3.2.1 Surface waterways

Discuss expected water quality leaving the project site in terms of the EPP (Water), ANZECC Guidelines 2000 and/or background levels. Quality characteristics discussed should be appropriate to the downstream water uses or significant aquatic flora and fauna that may be affected. Discuss the potential environmental harm to the flow and the quality of surface waters from all phases of mining activities. The containment, treatment or release of any wastewater or stormwater that has contacted waste dumps, stockpiles or other disturbed areas of the site from the proposed activities should be discussed.

Investigate the effects of predictable climatic extremes (droughts, floods for example, Q20, Q50, Q100) upon the structural integrity of the containing walls and the quality of water contained in the tailing storage and/or disposal site(s), and other ponds, flows and quality of water discharged, and relevant surface waters and waterways. The design of all water storage facilities should follow the Technical Guidelines for Site Water Management. Management strategies for the tailing storage and/or disposal site(s), and process water pond should be included to mitigate potential impacts on relevant creeks and rivers.

Discuss the need or otherwise for licensing of any creek diversions under the *Water Act 2000*. The effect of any stream modifications on downstream flows should be assessed. Water allocation and water sources should be established in consultation with DNRM and consider the existing Moratorium and Gulf Draft Water Resource Plan.

Discuss options for mitigation and the effectiveness of mitigation measures with particular reference to acidity, salinity, metals and other emissions of a hazardous or toxic nature to human health, flora or fauna. Discuss methods to prevent acid formation and for seepage control. Should co-disposal or blending be used as a method for preventing acid mine drainage, then mass balance calculations should be used to show that the resultant material is not acid forming.

Propose a monitoring program for the detection of water and/or sediment contamination from the project and identify suitable parameters and trigger levels in a manner consistent with the ANZECC Guidelines 2000, background water quality data and potential contaminants from the project. This section should detail the water and sediment monitoring program including:

- the methodology;
- parameters to be measured;
- frequency;
- monitoring locations;
- trigger levels;
- monitoring of any significant aquatic flora or fauna species downstream;
- quality assurance and reporting procedures; and
- data interpretation.

Detail contingency plans and remedial action to be taken in the event of an exceedance of water or sediment quality limits.

4.3.2.2 Groundwater

Assess the potential environmental harm caused by the project to local groundwater resources. The impact assessment should define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the project with regards to groundwater depletion, recharge and contamination, and propose management options to prevent, monitor and mitigate these effects. The response of the groundwater resource to the progression and final cessation of the project should be described.

Provide details of the following when evaluating the potential impact of the proposed project on the groundwater regime:

- The potential impact of the proposed project on the local groundwater regime caused by mine dewatering, use of bores, final voids, waste rock dumps and the tailing storage and/or disposal site(s), which will include impacts on neighbouring private facilities (bores), riparian ecology, and surface water flows;
- Control strategies for groundwater flow into mining pits;
- Impacts of final voids or water in final voids on groundwater resources; and
- Abstraction of water from bore fields (if required) and potential drawdown on the water table.

If groundwater modelling indicates off-site impacts on private water facilities, riparian vegetation or surface water flows, the details of the following should be provided:

- An action plan to restore or provide alternative supplies; and
- Remedial strategies to be put in place to minimise the impacts.

Provide details of a monitoring program for groundwater to detect any change in water quality and levels by the proposed project. Groundwater quality monitoring parameters and trigger levels should be proposed with regard for ANZECC Guidelines 2000 and background levels.

4.4 Air

4.4.1 Description of environmental values

4.4.1.1 Air quality

This section describes the existing air environment that may be affected by the proposal. The following topics may be addressed (note - the topics are not an exhaustive treatment of all possible air or impacts).

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

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

4.4.2 Potential impacts and mitigation measures

4.4.2.1 Air quality

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. Information should be submitted on the use of new technologies to reduce air emissions from the stack(s) or other emission sources.

The objectives for air emissions should be stated in respect of relevant standards (ambient and ground level concentrations), relevant emission guidelines, and any relevant legislation, and the emissions modelled using a recognised atmospheric dispersion model. Estimation of fugitive emissions of dust and the impact of its coarse (deposition) and fine components (PM_{10}) should also be included. 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, should also be detailed.

The proposed levels of pollutant emissions from point sources should be compared with the National Health and Medical Research Council (NHMRC) national guidelines (1985) for control of emissions from stationary sources. Impacts predicted by air dispersion modelling should be compared with the National Environmental Protection Measures (NEPM) for ambient air quality (1998), and air quality goals in Queensland's *Environmental Protection (Air) Policy (1998).*

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

The extent to which suspended and fine particle (PM10) emissions from the proposal and existing emission sources within the region will impact on airshed quality.

The extent to which NOx and volatile hydrocarbon emissions from the proposal and existing emission sources within the region will contribute to the generation of photochemical smog.

The extent to which sulfur dioxide emissions from the proposal and existing emission sources within the region will contribute to the generation of acid rain or acidification of other atmospheric condensation, such as dew.

The human health risk associated with emissions from the facility of a hazardous or toxic nature should be assessed (that is, those pollutants that are not covered by the National Environmental Protection Council (ambient air quality) Measure or the Environmental Protection (Air) Policy 1998).

The National Health and Medical Research Council 'National guidelines for control of emissions of air pollutants from new stationary sources' covers a fairly limited list of generic industry sources. Therefore in order to assess the extent to which the proposal complies with best practice environmental management, the emissions from the facility should be compared to best practice emissions from a conventional mining operation (or other equivalent process).

Features of the proposal designed to suppress or minimise emissions, including dusts and odours, should be detailed.

The proposed levels of emissions of dust, fumes and odours should include emissions during normal and upset conditions. Consideration should be given to the range of potential upset condition scenarios including the air emissions that may be generated as a result.

Where there is no single atmospheric dispersion model that is able to handle the different atmospheric dispersion characteristics exhibited in the proposal area (that is, strong convection, terrain features, temperature inversions and pollutant re-circulation), a combination of acceptable models will need to be applied.

The limitations and accuracy of the applied atmospheric dispersion models should be discussed. The air quality modelling results should be discussed in light of the limitations and accuracy of the applied models.

Air quality predictions should be compared to the relevant goals in the National Environmental Protection Council (Ambient Air Quality) Measure and the Environmental Protection (Air) Policy 1998 goals.

Air shed management and the contribution of the proposal to air-shed capacity in view of existing and future users of the air shed for assimilation.

4.4.2.2 Greenhouse gas abatement

Provide an assessment of greenhouse gas emissions from the project including:

- An inventory of proposed future annual emissions for each greenhouse gas and total emissions expressed in carbon dioxide equivalent terms for each component of the project;
- The intended measures to avoid and minimise greenhouse emissions; and
- Methodologies by which estimates were made.

4.5 Waste

4.5.1 Description of environmental values

This section should complement other sections of part 4 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 environmental management plan (EM Plan). Refer to each of the waste streams described in section 3.8 and provide references to environmental values described in other sections of part 4 of the EIS.

4.5.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing environmental values from impacts by wastes, to describe how nominated quantitative standards and indicators may be achieved for waste management and how the achievement of the objectives will be monitored, audited and managed.

Assess the potential impact of all wastes to be generated, and provide details of each waste in terms of:

- Operational handling and fate of all wastes, including storage;
- Proposed on-site treatment method;
- 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;
- Proposed discharge/disposal criteria for liquid and solid wastes;
- Measures to ensure stability of the dumps and impoundments should be described;
- Methods to prevent, seepage and contamination of groundwater from stockpiles and/or dumps should be given;
- Waste minimisation techniques proposed; and
- Decommissioning of the site..

Having regard for the EPP (Waste), the EIS should indicate the results of investigation into the feasibility of using waste avoidance, waste minimisation, reuse, recycling and cleaner technology options during the construction and operating phases of the project. Waste minimisation and treatment, and the application of cleaner production techniques, should also be applied to gaseous wastes, particularly nitrogen oxides, sulfur oxides, particulates and carbon dioxide.

Having regard for the requirements of the EPP (Water), the EIS should present the methods to avoid stormwater contamination by raw materials, wastes or products and present the means of containing, recycling, reusing, treating and disposing of stormwater.

4.6 Noise and vibration

4.6.1 Description of environmental values

The function of this section is to describe the existing environmental values that may be affected by noise and vibration from mining activities in the context of environmental values as defined by the EP Act and *Environmental Protection (Noise) Policy 1997* (EPP (Noise)).

If the project could adversely impact on the noise environment, baseline monitoring of noise should be undertaken at a selection of sensitive sites potentially affected by the project. Noise sensitive places are defined in the EPP (Noise). The locations of sensitive sites should be identified on a map at a suitable scale. The results of any baseline monitoring of noise and vibration in the proposed vicinity of the project should be described.

Sufficient data should be gathered to provide a baseline for later studies. Monitoring methods should adhere to accepted best-practice methodologies. Monitoring methods should adhere to relevant Environmental Protection Agency guidelines and Australian Standards, and any relevant requirements of the *Environmental Protection (Noise) Policy 1997.*

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

4.6.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing environmental values from impacts by noise and vibration, to describe how nominated quantitative standards and indicators may be achieved for noise and vibration management and how the achievement of the objectives will be monitored, audited and managed.

Information (noise contours, modelling results) should be submitted, 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 residence should be quantified in terms of objectives, standards and indicators to be achieved. Provide proposals to minimise or eliminate these effects, including details of any screening, lining, enclosing or bunding. Discuss timing schedules for operations, with respect to minimising environmental harm, including environmental nuisance from noise.

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

Provide information on blasting which might cause ground vibration or fly rock on or adjacent to the mine site, with particular attention given to places of work or residence. The magnitude, duration and frequency of any vibration should be discussed. Blasting noise and vibration limits are stated in section 61 of the *Environment Protection Regulation, 1998* and reference should also be made to the EPA Ecoaccess Guideline, Noise and vibration from blasting. Discuss measures to prevent or minimise environmental harm including nuisance.

Off-site road transport noise and vibration should be described.

4.7 Nature conservation

4.7.1 Description of environmental values

The function of this section is to describe the existing environmental values for nature conservation that may be affected by the mining activities in the context of environmental values as defined by the EP Act and the NC Act.

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

- integrity of ecological processes, including habitats of rare and threatened species;
- conservation of resources;
- biological diversity, including habitats of rare and threatened species;
- integrity of landscapes and places including wilderness and similar natural places; and
- aquatic and terrestrial ecosystems.

A discussion should be presented on the nature conservation values of the areas likely to be affected by the proposal. The flora and fauna communities which are rare or threatened, and environmentally sensitive localities (including waterways, riparian zone, old growth Indigenous forests, wilderness and habitat corridors) should be described. The description should include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and state perspective. The description should indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) produced by the EPA (for example, see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006).

The EIS should identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change. Areas of special sensitivity include 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. The capacity of the environment to assimilate discharges/emissions should be assessed. Proposal proximity to any biologically sensitive areas should be described.

Reference should be made to State and Commonwealth endangered species legislation. While mining activities are exempt from the Queensland *Vegetation Management Act 1999* (VMA), the environmental values of the site should be described with reference to matters that would otherwise be protected under the VMA. The findings of any regional vegetation management plan should also be referenced.

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

Key flora and fauna indicators should be identified for future ongoing monitoring. Surveys of flora and fauna need to be conducted throughout the year to reflect seasonal variation in communities and to identify migratory species.

Draft EPA guidelines for "Fauna and Flora Assessment in EIA" provide further details. The EPA should be consulted to obtain these guidelines, and determine the scope of any biological studies before they are undertaken.

4.7.1.1 Terrestrial flora

Provide mapping at a suitable scale (for example, 1:10,000 or better) with descriptions of the vegetation units mapped and regional ecosystems identified. Sensitive or important vegetation types should be highlighted including their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types.

Maps and aerial photographs should be used to establish the significance of the project area in a local/regional context. This assessment should consider the ecological processes of the project area.

Provide the survey site locations, conditions at the time of the survey and methodology of sampling, along with additional information sources used to identify species likely to occur. Survey work should include surveys conducted after rainfall events to identify the presence of conservation significant species that will only be apparent during the 1-2 months following larger rainfall events.

The occurrence of plant species of conservation significance should be geocoded to mapped vegetation units or habitats, which can then be used to map areas to be protected.

The existence of rare or threatened species should be specifically addressed. The surveys should include species structure, assemblage, diversity and abundance. The description should also contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests.

Discuss the existence of important local and regional weed species.

The assessment of environmental values for flora should include:

- plant species of conservation significance;
- fauna of conservation significance (refer to 4.7.1.2 Terrestrial fauna); and
- ecological function.

Plant species of conservation significance are those plants that are:

- listed under the *Environment Protection and Biodiversity Conservation Act* (Cwlth) (EPBC Act) (National significance);
- listed under the *Nature Conservation Act 1992* (Qld) (NC Act) (State significance); or
- regionally uncommon, restricted or endemic.

The terrestrial vegetation communities within the affected areas should be described at an appropriate scale (for example, 1:10 000 or better) using aerial photographs, existing EPA mapping and a sampling intensity that supports this scale. Mapping should show the following:

- Location and extent of vegetation types using the EPA's regional ecosystem type descriptions in accordance with *The Conservation Status of Queensland's Bioregional Ecosystems* (Sattler P.S. &

Williams R.D.1999) and the EPA's web site listing the conservation status of regional ecosystems (Regional Ecosystem Description Database [REDD]). Continued consultation with the EPA will be required to determine the most up to date conservation status of mapped vegetation;

- Smaller key communities and habitats (1:10 000 or better) that may be conservation significant;
- Regionally significant (for example, restricted/endemic) regional ecosystems/vegetation communities.
- Within each defined (standard system) vegetation community, a minimum of three sites (numbers should be discussed with the EPA) should be surveyed for plant species, as follows:
    - Site data should be recorded in a form compatible with the Queensland Herbarium CORVEG database;
    - The minimum site size should be 10m by 50m;
    - 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 NCWR 1994, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

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

4.7.1.2 Terrestrial fauna

The terrestrial fauna occurring in the areas affected by the project should be described, noting the broad distribution patterns in relation to vegetation, topography and substrate.

Provide survey site locations, conditions at the time of survey and methodology of sampling, along with additional information sources used to identify species likely to occur.

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

- Species diversity (that is, a species list) and abundance of animals, including amphibians, birds, reptiles, mammals and bats;
- Any species that are poorly known but suspected of being rare or threatened;
- Habitat requirements and sensitivity to changes, including movement corridors and barriers to movement;
- The existence of feral or exotic animals;
- The development of detailed species profiles for all known and potential rare, threatened or otherwise noteworthy species or communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements and threats. This profile should include a risk assessment of threats to the species and the relationship to known or potential impacts of the proposed project. It should include a risk assessment of the underestimation of potential impacts (unforeseen future impacts). In particular the risk assessment should identify, but

not be restricted to, potential impacts of increased road traffic, increased feral animal impacts, increased weed invasion, direct loss of habitat, impacts on riparian and seasonal wetlands and poor or inadequate rehabilitation activities, for example the uncontrolled spread of introduced pasture species such as buffel grass; and

- The development of detailed species profiles for migratory birds, nomadic birds and/or terrestrial fauna as per the instructions above.

The occurrence of fauna of conservation significance should be geocoded to mapped vegetation units or habitats, which can then be used to map areas to be protected.

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

4.7.1.3 Aquatic biology

The aquatic flora and fauna occurring in the areas affected by the project should be described, noting the patterns and distribution in the ephemeral waterways.

Provide survey site locations, conditions at the time of survey and methodology of sampling describing frequency/timing of sampling, quality assurance and reporting procedure, data interpretation monitoring guidelines/objectives, along with additional information sources used to identify species likely to occur. Provide criteria used to assess the appropriate timing of aquatic fauna sampling.

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

- Fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring within ephemeral waterways on the project which may be disturbed;
- Aquatic (waterway) plants;
- Aquatic substrate and stream type; and
- Any downstream waterway habitat that is likely to be impacted by the project.

4.7.2 Potential impacts and mitigation measures

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

The discussion should cover all likely direct and indirect environmental harm on flora and fauna, particularly in sensitive areas. It should also include human originated impacts and the control of any domestic animals introduced to the area.

Describe strategies for protecting any rare or threatened species and any obligations imposed by State or Commonwealth legislation or policy or international treaty obligations (that is, JAMBA, CAMBA).

Assess the potential environmental harm to the ecological values of the affected area, arising from the construction, operation and decommissioning of the project including clearing, salvaging or removal of vegetation and discuss the indirect effects on vegetation not cleared.

Short-term and long-term effects should be considered and whether the impacts are reversible or not. Mitigation measures and/or offsets should be proposed for adverse impacts. Any departure from no net loss of ecological values should be described.

Discuss the potential environmental harm on flora and fauna of any alterations to the local surface and groundwater environment with specific reference to environmental harm on riparian vegetation or other sensitive

vegetation communities. This should include the potential environmental harm to any identified fisheries or aquatic species of significance on or adjacent to the project from any proposed modifications to watercourses such as culverts, pipelines or stream diversions. Describe measures to mitigate the environmental harm to habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains.

Discuss the provision of buffer zones, movement corridors and strategies to minimise environmental harm on migratory, nomadic and aquatic animals.

Weed control strategies aimed at containing existing weed species and ensuring no new invasive weeds are introduced to the area are required. Feral animal management strategies should also be addressed. Develop strategies to ensure that the project does not contribute to increased encroachment of a feral animal species. Reference should be made to the local government authority's Pest Management Plan when determining control strategies, should such a plan exist.

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

Areas which would be regarded as sensitive with regard to flora, fauna and nature conservation have one or more of the following features which should be identified, mapped, avoided or effects minimised:

- Important habitats of species listed under the NC Act and/or EPBC Act as presumed Extinct, Endangered, Vulnerable or Rare;
- Regional ecosystems recognised by the EPA as Endangered or Of Concern and/or ecosystems listed as presumed Extinct, Endangered or Vulnerable under the EPBC Act;
- Good representative examples of remnant regional ecosystems or regional ecosystems that are poorly represented in protected areas;
- Sites containing near-threatened or bioregionally significant species or essential, viable habitat for near-threatened or bioregionally 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 or the EPBC Act;
- Sites containing common species which represent a distributional limit and are of scientific value;
- Sites containing high biodiversity which are of a suitable size or with connectivity to corridors or protected areas to ensure survival in the longer term;
- Areas of major interest or critical habitat declared under the NC Act or high nature conservation value areas or areas vulnerable to land degradation under the *Vegetation Management Act 1999* (VM Act):
    - Sites of palaeontologic significance such as fossil sites;
    - Sites of geomorphologic significance such as lava tubes or karsts;
    - Sites containing other special ecological values, for example, high habitat diversity and areas of high endemism;
    - Protected areas which have been proclaimed under the NC Act or are under consideration for proclamation; and
    - Ecosystems which provide important ecological functions such as wetlands of national state and regional significance, riparian vegetation, important buffer to a protected area or important habitat corridor between areas.

Options for the use of threatened plant species and re-establishing threatened vegetation communities will be discussed

4.8 Cultural heritage

4.8.1 Description of environmental values

The function of this section is to describe the existing environment values for cultural heritage that may be affected by the mining activities in the context of environmental values as defined by the EP Act, the *Aboriginal Cultural Heritage Act* 2003, *Queensland Heritage Act 1992* (QH Act) and any other relevant act.

A cultural heritage study should be conducted, which will describe Indigenous and non-Indigenous cultural heritage sites and their values. Such a study should be conducted by an appropriately qualified cultural heritage practitioner and should include the following:

Liaison with the relevant Indigenous community/communities concerning:

- Places of significance to that community (including archaeological sites, natural sites, story sites etc); and
- Appropriate community involvement in field surveys;
- Any requirements by communities and/or informants relating to confidentiality of site data must be highlighted. Non-Indigenous communities may also have relevant information;
- A systematic survey of the proposed development area to locate and record Indigenous and non-Indigenous cultural heritage places;
- Significance assessment of any cultural heritage sites/places located;
- The impact of the proposed development on cultural heritage values;
- A report of work done, which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and recommendations; and
- A permit to conduct the research and survey will be required under the provisions of the *Aboriginal Cultural Heritage Act* 2003.

As requested by the traditional owners, the Kalkadoon People, information on places of Indigenous significance, Indigenous archaeological sites and the Indigenous cultural heritage reports themselves should not be presented in the EIS. Rather, any such information should be provided in a confidential report to DNRM. However, a description of the methodology used and the work carried out should be provided.

4.8.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing non-Indigenous cultural heritage environmental values, to describe how nominated quantitative standards and indicators may be achieved for cultural heritage management and how the achievement of the objectives will be monitored, audited and managed.

The environmental harm (if any) to non-Indigenous cultural heritage values in the vicinity of the project should be managed under a cultural heritage management plan (CHMP), developed specifically for the project. The CHMP should provide a process for the management of cultural heritage places both identified and sub-surface at the project. The CHMP should be based on information contained in archaeological and/or anthropological reports on the survey area and cultural reports. The CHMP should address and include the following:

- Processes for mitigation, management and protection of identified non-Indigenous cultural heritage places and material in the project areas, including associated infrastructure developments, both during the construction and operational phases of the project;

- A process for including Aboriginal/Torres Strait Islander people associated with the development area in protection and management of Indigenous cultural heritage;
- Provisions for the management of the accidental discovery of cultural material, including burials;
- The monitoring of foundation excavations and other associated earthwork activities for possible sub-surface cultural material;
- Cultural awareness training or programs for project staff; and
- A conflict resolution process.

The development of the non-Indigenous CHMP should be negotiated with all stakeholder representatives and where there is a role or responsibility identified for the EPA, it should be party to the discussions.

An appropriately qualified cultural heritage practitioner holding a permit under provisions of the *Aboriginal Cultural Heritage Act 2003* should do any collection of artefactual material as part of a mitigation strategy. Representatives of the relevant Indigenous community/communities should accompany the cultural heritage practitioner. The DNRM Regional Manager (Cultural Heritage) should be consulted for the provision of general advice, including the appropriate conduct of cultural heritage surveys, the collection of artefacts and the necessary permits.

As requested by the traditional owners, the Kalkadoon People, should an Indigenous CHMP be needed then details of this CHMP should not be presented in the EIS. Rather, any such information should be provided in a confidential report provided to the DNRM. The proponent and the Kalkadoon people should negotiate an indigenous land use agreement (ILUA) and the CHMP should be a requirement of this process.

4.9 Social environment

4.9.1 Description of environmental values

The function of this section is to describe the existing social environment that may be affected by the mining activities in the context of environmental values as defined by the EP Act and EPPs.

Describe the amenity and use of the project area and adjacent areas for rural, mining, recreational, educational or residential purposes. Consideration should be given to:

- Community infrastructure and services, access and mobility;
- Population and demographics of the affected community;
- Recreational and cultural facilities and activities in relation to the affected area;
- On-farm activities near the proposed mining activities; and
- Number of properties directly affected by the project and current property values.

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

- the integrity of social conditions, including amenity and liveability, harmony and wellbeing, sense of community, access to recreation, and access to social and community services and infrastructure.; and
- public health, education and safety (refer to section 4.18).

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 in section 4.8 (Cultural Heritage) and section 4.12 (Economic Environment).

4.9.2 Potential impacts and mitigation measures

The social impact assessment of the project should consider the project's impact, both beneficial and adverse, on the local community through the information gathered in the community consultation program and the analysis of the existing social environment. The impacts of the project on local and regional residents, community services and recreational activities are to be analysed and discussed for all stages of the project.

The nature and extent of the community consultation program is to be described and a summary of the results incorporated in the EIS. The social impact assessment of the project is to be carried out in consultation with the Department of Communities.

Describe the likely response of affected communities and identify possible beneficial and adverse impacts (both direct and cumulative). These impacts should be considered both at the regional and local level. Attention should be paid to impacts on:

- demographic, social, cultural and economic profiles;
- local residents' values and aspirations;
- community services and community cohesion due to both construction and operational workforces and associated contractors; and
- human service delivery.

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

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

In regard to affected Indigenous and non-Indigenous communities respectively, particular attention should be paid to the effects on:

- The ability of both Indigenous and non-Indigenous people to live in accordance with their own values and priorities;
- The use of and access to culturally important areas and landscapes; and
- The ability to participate in regional and local employment and training opportunities.

An assessment of the impacts on the Aboriginal population will be undertaken using data specific to Indigenous groups.

For identified adverse impacts to social values, mitigation and enhancement strategies should be suggested. Details of steps towards facilitating initial negotiations towards acceptance of these strategies should be described.

4.10 Health and safety

4.10.1 Description of environmental values

The function of this section is to describe the existing community values for health and safety that may be affected by the mining activities in the context of environmental values as defined by the EP Act and EPPs.

Any impacts on the health and safety of the community, workforce, suppliers and other stakeholders should be detailed in terms of health, safety, quality of life from factors such as air emissions, dust and noise.

4.10.2 Potential impacts and mitigation measures

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

Assess the effects on project workforce of occupational health and safety risks and impacts on the community in terms of health, safety and quality of life from project operations and emissions. Measures to control mosquito and biting midge breeding should be described.

Practical monitoring regimes should also be recommended in this section.

4.11 Hazards and risk

4.11.1 Description of environmental values

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

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

- Chemical name;
- Concentration in raw material chemicals;
- Concentration in operation storage tank;
- UN number;
- Packaging group;
- Correct shipping name; and
- Maximum inventory of each substance.

Details should be provided of:

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

4.11.2 Potential impacts and mitigation measures

The function of this section is to define and describe the objectives for protecting or enhancing environmental values from hazards and risk, to describe 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 project on sensitive areas and resources such as water reserves, State and local government controlled roads, places of residence and work, and recreational areas. The *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* should be referred to as a guideline for this process.

Detail whether there is adequate water supply for fire fighting on the project.

The assessment should outline the implications for the impacts on surrounding land uses, and involve consultation with the Department of Emergency Services, Queensland Fire and Rescue Authority and Queensland Ambulance Service where required. Consultation with the appropriate shire council and government departments regarding disaster risk management studies, counter disaster plans and emergency management plans should be conducted.

Information required in future emergency management plans and risk management systems should be described and evaluated and appropriate plans prepared.

4.12 Economic environment

4.12.1 Description of environmental values

The function of this section is to describe the existing economic environment that may be affected by the mining activities in the context of environmental values as defined by the EP Act and EPPs.

Describe the character and basis of the local and regional economies 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);
- Historical descriptions of large-scale resource developments and their effects in the region; and
- Describe the economic attributes for the affected area in terms of the integrity of economic conditions and the economic benefits to the affected communities.

4.12.2 Potential impacts and mitigation measures

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

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

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

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

- significance of this project on the local and regional economic context;
- long and short-term beneficial (for example, job creation) and adverse impacts that are likely to result from implementation of the proposed development;
- potential, if any, for direct equity investment in the project by local businesses or communities;
- 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);

- potential economic impact of any major hazard identified in section 4.20;
- distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups;
- value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

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

4.13 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 (EM Plan)

The EM Plan for a proposed mining project is an integral part of the EIS. It should be developed from the preceding information in the EIS, but should be capable of being read as a stand-alone document without reference to other parts of the EIS. The general contents of the EM Plan should comprise:

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

The QEPA Guideline 8 "Preparation of an Environmental Management Overview Strategy" should be used to prepare the EM Plan.

A plan of operations (Plan) will be required to be lodged before commencement of activities for a period of up to five years.

6. References

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

7. Recommended appendices

A1. Final terms of reference for this EIS

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

A2. Development approvals

A list of the development approvals required by the project should be presented.

A3. The standard criteria

A brief summary of the proposal's compatibility with ESD policy and other relevant policy instruments such as the standard criteria as defined by the Environmental Protection Act (Qld) should be presented. Consideration should

focus on The National Strategy for Ecologically Sustainable Development, published by the Commonwealth Government in December 1992 (available from the Australian Government Publishing Service). Each principle should be discussed and conclusions drawn as to how the proposal conforms. A life-of-project perspective should be shown.

A4. Research

Proposals for researching alternative environmental management strategies or for obtaining any further necessary information should be outlined in an appendix.

A5. Consultation report

The summary consultation report appendix for an EIS under the EP Act should 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 should describe how 'interested' and 'affected persons,' and any 'affected parties' as defined in the EPBC Act, were identified.

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

The consultation report appendix should 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 should include the methodology used in the community consultation program including criteria for identifying stakeholders and the communication methods used.

A6. Study team

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

A7. 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;
- surface water hydrology;
- groundwater;
- flora and fauna studies;
- economic studies, CBA; and
- hazard and risk studies.

9.0 Approved by

Signed	**22/4/2005**
Signature	Date

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