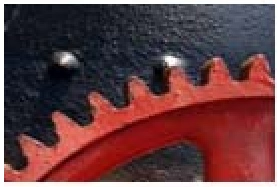
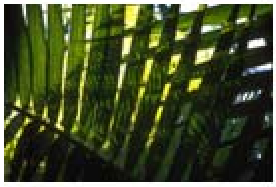


VITAL METALS LIMITED
WATERSHED PROJECT



DRAFT TERMS OF REFERENCE

PREPARED BY

ENVIRONMENTAL & LICENSING PROFESSIONALS PTY LTD

VERSION 01

MARCH 2007

Environmental & Licensing Professionals • Pty • Ltd
ABN 40 010 095 379

WATERSHED PROJECT

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Prepared for:

Vital Metals Limited

Prepared by:

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TABLE OF CONTENTS

CONTENT OF THE EIS

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 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

The function of the introduction is to explain why the EIS has been prepared, what the EIS relates to in terms of the overall Vital Metals operations and what the EIS sets out to achieve. It should also define the audience to whom it is directed, and contain an overview of the structure of the document. Throughout the EIS, Factual information contained in this document should be referenced.

1.1 Project proponent

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

1.2 Project description

A brief description of the key elements of the project should be provided and illustrated. Any major associated infrastructure requirements should also be summarised. Detailed descriptions of the project should follow in Section 3.

A brief description should be provided of studies or surveys that 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

A statement of the objectives which have led to the development of the proposal and a brief outline of the events leading up to the proposal's formulation, including 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 statement (EIS) process

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

1.4.1 Methodology of the EIS

This section should provide a description of the EIS 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 1.4) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation. The information in this section is required to ensure:

- relevant legislation is addressed;
- readers are informed of the process to be followed; and

- stakeholders are aware of any opportunities for input and participation.

1.4.2 Objectives of the EIS

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

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

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

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

When considering whether an impact is or is not significant, the proponent should take account of both the intensity of the impact and the context in which it would occur.

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

In brief, the EIS objectives should be 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 and their likely relative environmental management outcomes is a key aspect of the EIS.

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

1.4.3 Submissions

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

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

1.5 Public consultation process

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

The 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* (see section 7). Similar requirements, though non-statutory, are usually applied to EIS processes under other State legislation.

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

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

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

This section should explain the legislation and policies controlling the approvals process. Reference should be made to the Queensland *Environmental Protection Act 1994* and other relevant Queensland laws. Any requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* should also be included.

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

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

The terms of reference and the EIS should provide separate discussions under sub-headings in the relevant sections that describe the values and address the potential impacts on NES matters. The locations of those sub-headings should be readily identifiable from the Table of Contents. For example, if one of the controlling provisions was ‘Listed threatened species and communities’, then subsections, headed ‘Matters of national environmental significance’, should be placed in Section 4.7 (Nature conservation) under both the *Description of environmental values* and *Potential impacts and mitigation measures* headings. Those subsections should address exclusively and fully the issues relevant to the controlling provisions.

1.6.2 Planning processes and standards

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

2.0 Project need and alternatives

2.1 Project justification

The justification for the project should be described, with particular reference made to the economic and social benefits, including employment and spin-off business development, which the project may provide, balanced with the potential environmental impacts of construction and operations. The status of the project should be discussed in a regional, State and national context.

2.2 Alternatives to the project

This section should describe feasible alternatives, including conceptual, technological and locality alternatives to the project, and 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. Comparative environmental impacts of each alternative should be summarised.

The interdependencies of the proposal components should be explained, particularly in regard to how each of any industrial developments, or various combinations of industrial developments, and any infrastructure requirements relate to the viability of the proposal. Should water supply, power, transport and/or storage infrastructure be included as an element of the proposal, this section should include a description of and rationale for such infrastructure.

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

This information is required to assess why the scope of the proposal is as it is and to ensure that the ESD principles, best practice environmental management and sustainable development aspects have been considered and incorporated during the scoping and planning of the proposal.

3.0 Description of the project

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

3.1 Location

3.1.1 Regional context

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

3.1.2 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, and should include;

- Land tenures;
- Mining and exploration tenures;
- Present land uses and Planning Scheme zonings;
- Surrounding industries and other land uses;
- Features of State and National environmental Significance;
- Locations and layout of new structures;
- Location of all existing and proposed road and rail infrastructure;
- Photo images at appropriate scales;
- The location of waterways, including those defined as watercourses by the *Environmental Protection Regulations 1998*; and
- The location of any transport corridors such as roads, power lines and pipelines.

3.2 Construction

The extent and nature of the project's construction phase should be described. The description should include the type and methods of construction, the construction equipment to be used and the items of plant to be transported onto the construction site. Any staging of the proposal should be described and illustrated showing site boundaries, development sequencing and timeframes. The estimated numbers of people to be employed in the project construction phase should also be provided with a brief description of where those people may be accommodated and/or how they will be transported to the site. Methods of transport, routes, origin-destination of plant and equipment should be described along with the transport of goods, services and workers.

The following information regarding the construction workforce should be provided;

- Approximate numbers to be employed during construction;
- Outline of recruitment schedules and policies for recruitment of workers;
- Anticipated peaks in worker numbers during the construction period;
- Estimated percentage of workers to be accompanied by dependants; and
- A brief description of where the construction workers may be accommodated.

3.3 Operations

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

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

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

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

3.3.1 Location and tenure

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

- the location and boundaries of land tenures, in place or proposed, to which the project area is or will be subject;
- 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, accommodation etc; and
- the location of any proposed buffers surrounding the working areas.

Provision of a recent rectified air photo enlargement to illustrate components of the project in relation to the land and mining tenures and natural and built features of the area.

3.3.2 Mine life and mineral 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 4.2.1.2, Geology);
- the quantity of mineral to be mined annually including any proposed ramping of production or staging of development.

3.3.3 Mining methods and equipment

Specific details should be provided of the following:

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

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

3.3.4 Mine sequencing

Specific details should be provided of the following:

- the proposed sequence and timing of mining of each seam/ore body within the mining lease;
- the physical extent of excavations, location of stockpiles of overburden and/or mineral reject to be handled during the Project's operation or left after mining ceases—the description should include the rate of throughput of stockpiles of product, reject and overburden;
- the area disturbed at each major stage of the project;
- a schedule of availability for rehabilitation and
- the proposed post closure management and timing.

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

3.3.5 Processing and products

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

3.3.6 Ongoing evaluation and exploration activities

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

3.4 Materials handling

Describe and show on plans at an appropriate scale the proposed methods and facilities to be used for materials storage and for transferring product and other materials 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.

3.5 Infrastructure requirements

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

3.5.1 Transport—road/rail/ship

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

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

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

3.5.2 Energy

The EIS should describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the proposal. The locations of any easements should be shown on the infrastructure plan. Energy conservation should be briefly described in the context of any Commonwealth, State and local government policies.

3.5.3 Water supply and storage

The EIS should provide information on water usage by the project, including the quality and quantity of all water supplied to the site. In particular, the proposed and optional sources of water supply should be described (eg. bores, any surface storages such as dams and weirs,).

Estimated rates of supply from each source (average and maximum rates) should be given. Any proposed water conservation and management measures should be described. Water balance including all sources, use and losses (including discharge) should also be described.

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

3.5.4 Stormwater drainage

A description should be provided of the proposed stormwater drainage system and the proposed disposal arrangements, including any off-site services.

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. An erosion and sediment control plan should be provided which includes the design of sediment control structures downstream of disturbance areas and strategies for diverting clean water away from disturbed or contaminated areas should be described, and prepared by a suitably qualified person. Any contaminants of concern that are likely to leave the site should be identified and management procedures described.

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.

3.5.5 Sewerage

This section should describe, in general terms, the sewerage infrastructure required by the project. The EIS should provide volume estimates of domestic effluent that will be produced and the proposed method of disposal taking into account the Queensland recycling guidelines. This should include the physical and chemical characteristics of such effluent.

The EIS must include an assessment of likely impacts from the preferred disposal option.

3.5.6 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.

3.5.7 Accommodation and other infrastructure

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

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

3.6 Waste management

3.6.1 Character and quantities of waste materials

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

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

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

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

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

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

3.6.2 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 (potentially acid forming and non-acid forming) to be produced annually and during the life of the project and associated mineralisation;
- 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 investigations indicate it is required. Sampling should be representative with profiles of all geological units included and based on accepted statistical procedures. The sample regime and testing methodology to be used should take into account recognised guidelines such as those issued by Environment Australia (1997) and the USEPA (1992) 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;
- Mapping of pre-existing drainage lines;
- 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;
- Rehabilitation design of the waste rock disposal area; and
- Slope profiles that are consistent with intended land use and acceptable post mine land management and maintenance.

3.6.3 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 (tonnages) that will be produced by the project annually and for the life of the mine (including potentially acid forming and non-acid forming process wastes). 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, soils 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).

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. Final rehabilitation of any tailings storage and/or disposal site(s) should be discussed.

The construction of tailing storage and/or disposal site(s) bases and walls should be described with regards to construction materials, including source of suitable 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).

Consideration should be given as to whether the tailings and any other dams or ponds on the site would constitute dams or storages containing hazardous waste. The design of all containment structures on the site should be consistent with the current standards and criteria used in Queensland by a person with suitable qualifications and experience in Tailings Dam design.

The location of the storage and/or disposal site(s) with regard to pre-existing drainage lines, adjacent creeks and rivers should be described.

3.6.4 Waste Water

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

The EIS should consider the following effects:

- groundwater from excavations;
- rainfall directly onto disturbed surface areas;
- runoff from roads, plant and industrial areas, chemical storage areas (including roof water runoff);
- drainage (i.e. run-off plus any seepage or leakage);
- seepage from other waste storages;

- water usage for:
  - process use,
  - dust suppression, and
  - domestic purposes;
- evaporation;
- domestic sewage treatment - disposal of liquid effluent and sludge; and
- water supply treatment plant - disposal of wastes.

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 and reuse:

- groundwater dewatered from open cut pits;
- rainfall directing onto disturbed surface areas;
- tailings 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.

3.6.5 Air Emissions

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

The methods to be employed in the mitigation of impacts from air emissions should be described in section 4.5.

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

3.7 Rehabilitation and decommissioning

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the proposal. In particular, options for geochemically, geotechnically and hydrologically stable landform designs, self sustaining vegetation dovers 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 used including approximate areas, locations and details of rehabilitation success criteria to be used in monitoring rehabilitation shall be detailed. Post mining land suitability of the various land use shall also be described.

The strategies and methods presented for progressive and final rehabilitation of disturbed areas should demonstrate compliance with the objectives of the *Environmental management policy for mining in Queensland*, 1991, or with updated versions of that policy as they become available. Land suitability assessment should follow current best practice environmental management techniques. In particular, the strategies and methods should have the following objectives:

- Mining and rehabilitation should aim to create a landform with land use capability and/or suitability similar to that prior to disturbance unless other beneficial land uses are predetermined and agreed. The aim for mine decommissioning should follow a nil footprint area philosophy where reasonable and practicable.

- Mine wastes and disturbed land should be rehabilitated to a condition that is self-sustaining or to a condition where the maintenance requirements are consistent with an agreed post-mining land use.
- Surface and ground waters outside of the project footprint 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 and do not reduce the environmental value of waters to future users.

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

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

A description of 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) particularly with regard to such issues as final landform stability (section 4.2.2), rehabilitation of flora (section 4.7.2) and the long-term quality of water in any final voids (section 4.4.2). 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.

An estimate of the period of maintenance and monitoring following decommissioning will be established, dependant on the level of residual risk as determined by a suitably qualified person.

4.0 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*, and environmental protection policies. 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 proposal on the identified environmental values. Any likely environmental harm on the environmental values should be described.
- To describe any cumulative impacts on environmental values caused by the proposal, either in isolation or by combination with other known existing or planned sources of contamination.

- To present environmental protection objectives and the standards and measurable indicators to be achieved.
- 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 proposal. Measures should prevent, or where prevention is not possible, minimise environmental harm and maximise socio-economic and environmental benefits of the proposal. Preferred measures should be identified and described in more detail than other alternatives.
- Environmental protection objectives may be derived from legislative and planning requirements which apply to the proposal including Commonwealth strategies, State planning policies, local authority strategic plans, environmental protection policies under the *Environmental Protection Act 1994*, and any catchment management plans prepared by local water boards or land care groups. Special attention 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 proposal impact.

This section should address all elements of the environment, (such as land, water, air, waste, noise, nature conservation, cultural heritage, social and community, health and safety, economy, hazards and risk) in a way that is comprehensive and clear. To achieve this, the following issues 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 - note such studies may be required over several seasons). It should be explained how the environmental values were derived (e.g. by citing published documents or by following a recognised procedure to derive the values).
- Impact on environmental values: describe quantitatively the likely impact of the proposal on the identified environmental values of the area. The cumulative impacts of the proposal must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans should be addressed.
- Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial and aquatic ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the proposal and other proposals competing for use of the local air and water sheds.
- Where impacts from the proposal will not be felt in isolation to other sources of impact, it is recommended that the proponent develop consultative arrangements with other industries in the proposal's area to undertake cooperative monitoring and/or management of environmental parameters. Such arrangements should be described in the EIS.
- Environmental protection objectives: describe qualitatively and quantitatively the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). The measurable indicators and standards can be determined from legislation, support policies and government policies as well as the expected performance of control strategies. Objectives for progressive and final rehabilitation and management of contaminated land 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 eg. 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 (eg intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

It is recommended that the final terms of reference and the EIS follow the heading structure shown below. The mitigation measures, monitoring programs, etc., identified in this section of the EIS should be used to develop the environmental monitoring program for the project (see A2 – Environmental Management Plan).

4.1 Climate

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

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 4.2. The impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) should be addressed in Section 4.4 with regard to contamination of waterways and in Section 4.3 with regard to the design of the waste containment systems. The impacts of winds, rain, humidity and temperature inversions on air quality should be addressed in Section 4.5.

4.2 Land

4.2.1 Description of environmental values

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

4.2.1.1 Topography/geomorphology

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

Section 4.2. Commentary on the maps should be provided highlighting the significant topographical features.

4.2.1.2 Geology

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

Investigations into the physical, geotechnical and chemical properties of waste rock in both fresh and weathered forms needs to be determined for slope stability, rehabilitation and possible acid generation for waste rock dump design.

4.2.1.3 Mineral resources

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

The location, tonnage and quality of the mineral resources within the project area should be described in detail as indicated below and include the modifying factors and assumptions made in arriving at the estimates. The mineral resources should be estimated and reported in accordance with the *Australasian code for reporting of mineral resources and ore reserves* (the JORC Code - available at www.jorc.org/main.php) as appropriate.

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

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

4.2.1.4 Resource Utilisation

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 mineral resources that may be impacted upon or sterilised by the mining activities or related infrastructure.

4.2.1.5 Soils

A soil survey of the sites affected by the proposal should be conducted at a suitable scale, with particular reference to the physical and chemical properties of the materials that will influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land. Information should also be provided on soil stability and suitability for construction of proposal facilities.

Soil profiles should be mapped at a suitable scale and described according to the *Australian soil and land survey field handbook* (McDonald et al, 1990) and *Australian soil classification* (Isbell, 1996). An appraisal of the depth and quality of useable soil should be undertaken. Information should be presented according to the standards required in the *Planning guidelines: the identification of Good Quality Agricultural Land* (DPI, DHLGP, 1993), and the *State Planning Policy 1/92: Development and the conservation of agricultural land*.

4.2.1.6 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 assessment should set out soil and landform subclasses assigned to soil mapping units in order to derive land suitability classes. The limitations and land suitability classification system to use is that in Attachment 2 of Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (1995).

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

4.2.1.7 Infrastructure

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

4.2.1.8 Sensitive environmental areas

The proximity of the proposal to any environmentally sensitive areas should be shown on a map of suitable scale. Attachment 2 provides a listing of some sensitive areas that may be encountered. This section of the EIS should then identify whether any of those environmentally sensitive areas could be affected, directly and indirectly, by the proposal.

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

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

The proximity of the proposal elements to any of these elements should be identified. Attachment 3 is a listing of some of sensitive areas that may be encountered.

4.2.1.9 Scenic Values

The visual impact, in terms of the extent and significance of the changed skyline as viewed from places of residence, work and recreation, from road and other known vantage points day and night, during all stages of the project as it relates to the surrounding landscape is to be analysed and discussed. The assessment is to address the local and broader visual impacts of the project structures and associated infrastructure, using appropriate simulation. Diagrams and photos are to be used where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations.

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

4.2.1.9.1 Lighting

An assessment of all potential impacts of lighting of the project, during all stages, is to be provided, with particular reference to:

- The visual impact at night
- Night operations/maintenance and effects of lighting on fauna, flora and residents
- The potential impact of increased vehicular traffic; and
- Changed habitat conditions for nocturnal fauna and associated impacts.

4.2.1.9.2 Landscape character

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. It should 'set the scene' for the description of particular scenic values in the following section on visual amenity. The difference being that this section describes the general impression of the landscape that would be obtained while travelling through and around it, while the visual amenity section addresses particular panoramas and views (e.g. from constructed lookouts, designated scenic routes, etc.) that have amenity value.

All impacts of the project on the visual quality and landscape character of the site and the surrounding area are to be considered on both the broad and local level. Particular reference is to be made to the following:

- Impacts on existing land use that contribute to the character of the local area including a change in accessibility;
- Potential impacts to scenic amenity of any characteristic (e.g. National Park); and
- The visual absorption capacity of the site – the ability to absorb the impact of the proposed development.

Appropriate simulation to portray broad and near view and impacts of the project on visually sensitive areas, including the extent of significance of the skyline as viewed from known vantage points, is to be included.

The EIS should detail the scenic or landscape values of the area.

4.2.1.9.3 Visual amenity

Appropriate simulation to portray broad and near views and impacts of the project on visually sensitive areas, including the extent of significance of skyline as viewed from the known vantage points.

An assessment should be made of the existing visual quality/landscape character of the project site and the surrounding area and its prominence. 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.

4.2.2 Potential impacts and mitigation measures

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

4.2.2.1 Land use suitability

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

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

If the development adjoins or potentially impacts on good quality agricultural land, then an assessment of the potential for land use conflict is required. Investigations should follow the procedures set out in the Planning Guidelines: Separating Agricultural and Residential Land Uses (DNR, DLGP 1997).

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

4.2.2.2 Land disturbance

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

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

Where dams and roads and other infrastructure are to be constructed, proposals for the management of these structures after the completion of the proposal should be given. A contour map of the area should be provided. Also, the final drainage and seepage control systems and any long-term monitoring plans should be described.

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

A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed. A description of erosion and sediment control could be deferred until section 4.2.2.4.

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

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

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.

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 and void water quality;
- waste rock dumps;
- processing plant;
- infrastructure such as access roads, haul roads, the mine camps, offices, workshops pipelines, storage areas; and
- tailings storage and disposal sites.

The different disturbance types on the project, the final land use proposed for each and the reference sites or other completion criteria propose 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 methods 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 suitable scale. Describe the final depth of excavations and design of waste dumps and tailing storage and/ or disposal sites.

4.2.2.3 Land contamination

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

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

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

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

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

Nominate standards and indicators (success criteria) applicable to soil erosion from the proposal. A monitoring program should be proposed.

4.2.2.4 Soil erosion

Describe current erosion rates on the proposal site. For all permanent and temporary landforms, possible erosion rates and management techniques should be described. Where no baseline monitoring has been undertaken, an estimate based on modelling should be used. An erosion sediment control plan should be provided, and prepared by a suitably qualified person.

For each soil type identified, erosion potential (wind and water) 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 soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations.

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

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

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

Nominate standards and indicators (success criteria) applicable to soil erosion from the proposal. A monitoring program should be proposed.

4.2.2.5 Landscape character

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

The EIS should address the landscape character resulting from the proposed final land form design, such as the rehabilitation of the waste rock dump and tailings storage facilities. Comment should be made on the design(s) ability to integrate with naturally occurring land forms.

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

4.2.2.6 Visual amenity

This section should analyse and discuss the visual impact of the proposal on particular panoramas and outlooks. It should be written in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation, from road and other known vantage points day and night, during all stages of the project (construction, operational and decommissioning) as it relates to the surrounding landscape. The assessment is to address the visual impacts of the project structures and associated infrastructure, using appropriate simulation. Diagrams and photos are to be used where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations. Special consideration is to be given to public roads, public thoroughfares, and places of residence or work, which are within the line-of-sight of the project.

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

4.2.2.7 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:

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

4.2.2.8 Transport

The EIS should provide sufficient information to make an independent assessment of how the State-controlled and local government road networks will be affected. Consideration should be given to describing potential impacts that are likely to occur during the wet and dry season. Sufficient information should also be provided to enable an independent assessment of how the rail network (including infrastructure) will be affected. In both cases the impact on stakeholders along the whole route should be detailed and how any impacts will be managed.

Details should be provided of the impacts on environmental values of any new roads or road realignments. The EIS should include detailed analysis of probable impact of identified construction and operational traffic generated by the project with particular concern to impacts on road infrastructure, road users and road safety.

The EIS needs to identify impacts on the State-controlled and local government road networks and to indicate clearly the corrective measures necessary to address adverse road impacts and the costs involved. This will require the proponent to compare the traffic situation and road conditions with, and without, the project. Guidelines on the assessment of impacts on roads, available from the Department of Main Roads, should be followed.

Information about the impacts and proposed measures for dealing with those impacts should be prepared by the proponent in close consultation with the local District Office of the Department of Main Roads.

The EIS should provide details of the impact on any current or proposed rail infrastructure.

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

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

4.3 Waste

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 EM plan.

4.3.1 Description of environmental values

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

4.3.2 Potential impacts and mitigation measures

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

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

As part of the description, this section should provide details of each waste in terms of:

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

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

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

4.4 Water resources

4.4.1 Description of environmental values

This section describes the existing environment for water resources that may be affected by the proposal in the context of environmental values as defined in such documents as the *Environmental Protection Act 1994*, Environmental Protection (Water) Policy 1997 (EPP (Water)) and the ANZECC 2000. The definition of waters in the EPP (Water) includes the bed and banks of waters, so this section should address impacts on benthic sediments as well as the water column.

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

4.4.1.1 Surface waterways

A description should be given of the surface watercourses and their quality and quantity in the area affected by the proposal with an outline of the significance of these waters to the river catchment system in which they occur. Details provided should include a description of existing surface drainage patterns, and flows in major streams and wetlands. Also provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the proposal. Flood studies should include a range of annual exceedance probabilities for affected waterways, where data permits.

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

An assessment is required of existing water and stream sediment quality in surface waters and wetlands likely to be affected by the proposal in accordance with ANZECC 2000 and/or Queensland Water Quality Guideline 2006. The basis for this assessment should be a monitoring program, with sampling stations located upstream and downstream of the proposal. Complementary stream-flow data should also be obtained from historical records (if available) to aid in interpretation.

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

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

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

4.4.1.2 Groundwater

The EIS should review the quality, quantity and significance of groundwater at a local and regional scale.

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

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

A network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations should be developed in accordance with ANZECC 2000.

This section should include reference to:

Nature of the aquifer/s

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

Hydrology of the aquifer/s

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

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

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

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

4.4.2 Potential impacts and mitigation measures

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

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

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. Monitoring programs should be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the proposal.

Key water management strategy objectives include:

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

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

4.4.2.1 Surface water and water courses

4.4.2.1.1 Water Quality Impacts

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

Quality characteristics discussed should be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water (including concentrations of constituents) at the point of entering natural surface waters should be discussed along with toxicity of effluent constituents to flora and fauna. EPA guidelines on discharge to surface waters should be discussed in relation to proposed and/or potential discharges.

4.4.2.1.2 Hydrological Impacts

The hydrological impacts of the proposal should be assessed, particularly with regard to scouring and erosion, and changes to flooding levels and frequencies both upstream and downstream of the project. When flooding levels will be affected, modelling of afflux should be provided and illustrated with maps. Assessment of impacts on the flow and the quality of surface waters and effects on ecosystems should include an assessment of the likely effects on aquatic habitats as a result of any temporary diversion of existing water courses.

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

4.4.2.1.3 Dam Design

In relation to water supply and usage, and wastewater disposal, the EIS should discuss the quality and quantity of water stored on site and anticipated flows of water to and from the proposal area. Where dams, weirs or ponds are proposed, the EIS should investigate the effects of predictable climatic extremes (storm events, floods and droughts) on: the capacity of the dams to retain contaminants; the structural integrity of the containing walls; and the quality of water contained, and flows and quality of water discharged. The design of all water storage facilities should follow the technical guidelines on site water management.

The need or otherwise for licensing of any dams (including referable dams) under the *Water Act 2000* should be discussed. Water allocation and water sources should be established in consultation with Department of Natural Resources and Water.

4.4.2.1.4 Water Control Measures

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

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

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

4.4.2.2 Groundwater

The EIS should include an assessment of the potential environmental harm caused by the proposal to local groundwater resources, including the impact from any tailings storage areas and water stored in final void(s). Where abstraction is described, the potential impacts following cessation of pumping should be discussed.

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

An assessment should be undertaken of the impact of the proposal on the local ground water regime caused by the altered porosity and permeability of any land disturbance.

An assessment of the potential to contaminate groundwater resources and measures to prevent, mitigate and remediate such contamination should be discussed.

4.5 Air

4.5.1 Description of environmental values

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, SOx, NOx, and any other major constituent of the air environment that may be affected by the proposal should be discussed.

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

4.5.1.1 Greenhouse gas emissions

This section of the EIS should:

- provide an inventory of projected annual emissions for each relevant greenhouse gas, with total emissions expressed in 'CO2 equivalent' terms;
- estimate emissions from upstream activities associated with the proposed project, including fossil fuel based electricity consumed; and
- briefly describe method(s) by which estimates were made.

The Australian Greenhouse Office Factors and Methods Workbook (available via the internet) can be used as a reference source for emission estimates and supplemented by other sources where practicable and appropriate.

4.5.2 Potential impacts and mitigation measures

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

The proposed levels of emissions should be compared with the national environmental protection measures (NEPM) for ambient air quality (1998), the National Health Medical Research Council (NHMRC) national guidelines (1985) for control of emissions from stationary sources, and the Environmental Protection (Air) Policy (1998).

Where appropriate, the predicted average ground level concentrations in nearby areas should be provided. These predictions should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions should be identified and modelled where necessary. Ground level predictions should be made at any 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 on air quality should include at least the following matters:

- Evaluate the contribution of nitrogen oxides, sulfur oxides and volatile hydrocarbon emissions from the proposal to impacts within the local airshed. Address both acute and cumulative impacts by considering the project in conjunction with existing emission sources within the region.
- Evaluate 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 all hazardous or toxic pollutants should be assessed whether they are or are not covered by the National Environmental Protection Council (Ambient Air Quality) Measure or the Environmental Protection (Air) Policy 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 petroleum refining operation (or other equivalent process).
- Detail the features of the proposal designed to suppress or minimise emissions, including visual plumes, dusts and odours.

- The assessment of proposed levels of emissions of dust, fumes and odours should include emissions during both normal and non-standard operating conditions. Consideration should be given to the range of potential non-standard operating condition scenarios and 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 (e.g. 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 and dispersion of emissions.
- Modelling for a range of conditions will include sensitive receptors (i.e. National Parks and residents).

4.5.2.1 Greenhouse gas abatement

This section of the EIS should propose and assess greenhouse gas abatement measures. It should include:

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

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

- minimising clearing at the site (which also has imperatives besides reducing greenhouse gas emissions);
- integrating transport for the project with other local industries such that greenhouse gas emissions from the construction and running of transport infrastructure are minimised;
- maximising the use of renewable energy sources.

The environmental management plan in the EIS should include a specific module to address greenhouse abatement. That module should include:

- commitments to the abatement of greenhouse gas emissions from the project with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions,
- commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency;
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management;

- any voluntary initiatives such as projects undertaken as a component of the national Greenhouse Challenge Plus program, or research into reducing the lifecycle and embodied energy carbon intensity of the project's processes or products;
- opportunities for offsetting greenhouse emissions, including, if appropriate, carbon sequestration and renewable energy uses; and
- commitments to monitor, audit and report on greenhouse emissions from all relevant activities and the success of offset measures.

4.5.2.2 Climate change adaptation

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

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

4.6 Noise and vibration

4.6.1 Description of environmental values

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

If the proposed activity could adversely impact on the noise environment, baseline monitoring should be undertaken at a selection of sensitive sites affected by the proposal. Noise sensitive places are defined in the *Environmental Protection (Noise) Policy 1997*. Long-term measured background noise levels that take into account seasonal variations are required. The locations of sensitive sites should be identified on a map at a suitable scale. The results of any baseline monitoring of noise and vibration in the proposed vicinity of the proposal should be described.

Sufficient data should be gathered to provide a baseline for later studies. The daily variation of background noise levels at nearby sensitive sites should be monitored and reported in the EIS, with particular regard given to detailing variations at different periods of the night. Monitoring methods should adhere to accepted best practice methodologies, 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 (for example: major roads, quarrying activities, etc.).

4.6.2 Potential impacts and mitigation measures

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

Information, including mapped noise contours from a suitable acoustic model, 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 work or residence should be quantified in terms of objectives, standards and indicators to be achieved. Particular consideration should be given to emissions of low-frequency noise; that is, noise with components below 200Hz. The assessment should also include environmental impacts on terrestrial and avifauna, particularly migratory species. Proposed measures for the minimisation or elimination of impacts should be provided, including details and illustrations of any screening, lining, enclosing or bunding. A discussion should be provided of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise.

Information should be supplied on blasting which might cause ground vibration or fly rock on, or adjacent to, the site with particular attention given to places of work, residence, habitat, recreation, and general amenity. The timing, magnitude, duration and frequency of any vibration should be discussed. A discussion should be provided of measures to prevent or minimise environmental nuisance and harm. The resultant measures should be reflected in a specific Blast Management Plan for the project.

Blasting noise and vibration limits are provided in section 61 of the *Environmental Protection Regulation 1998*. Reference should also be made to the EPA Guideline: Noise and vibration from blasting.

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

4.7 Nature conservation

4.7.1 Description of environmental values

This section describes the existing environment values for nature conservation that may be affected by the proposal.

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, environmentally sensitive localities including waterways, riparian zone, rainforest remnants, 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 the region.

The EIS should identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change. Areas of special sensitivity include wetlands, wildlife breeding or roosting areas, any significant habitat or relevant bird flight paths for migratory species, bat roosting and breeding caves 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.

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

- important habitats of species listed under the *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* as presumed extinct, endangered, vulnerable or rare;

- regional ecosystems listed as 'endangered' or 'of concern' under State legislation, and/or ecosystems listed as presumed extinct, endangered or vulnerable under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*;
- good representative examples of remnant regional ecosystems or regional ecosystems which are poorly represented in protected areas;
- sites listed under international treaties such as Ramsar wetlands and World Heritage areas;
- sites containing near threatened or bio-regionally significant species or essential, viable habitat for near threatened or bio-regionally significant species;
- sites in, or adjacent to, areas containing important resting, feeding or breeding sites for migratory species of conservation concern listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (JAMBA) and between Australia and China (CAMBA);
- sites containing common species which represent a distributional limit and are of scientific value or which contains feeding, breeding, resting areas for populations of echidna, koala, platypus and other species of special cultural significance;
- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term; such land may contain:
  - natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or
  - degraded vegetation or other habitats that still supports high levels of biodiversity or acts as an important corridor for maintaining high levels of biodiversity in the area;
- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism;
- 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;
- sites of palaeontologic significance such as fossil sites;
- sites of geomorphological significance, such as lava tubes or karst;
- protected areas which have been proclaimed under the *Nature Conservation Act 1992* and *Marine Parks Act 1982* or are under consideration for proclamation; and/ or
- areas of major interest, or critical habitat declared under the *Nature Conservation Act 1992* or high nature conservation value areas or areas vulnerable to land degradation under the *Vegetation Management Act 1999*.

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

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

“Attachment B - Fauna and Flora Assessment in EIA, 2003” in the EPA’s guideline provides further details. The EPA should be consulted on the scope of any biological studies before they are undertaken.

4.7.1.1 Terrestrial flora

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

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

Vegetation mapping should provide vegetation mapping for all relevant project sites including new transport infrastructure, port facilities and irrigation land if relevant. Adjacent areas may also require mapping.

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

- location and extent of vegetation types using the EPA's regional ecosystem type descriptions in accordance with the Regional Ecosystem Description Database [REDD] available at the EPA's website;
- location of vegetation types of conservation significance based on EPA's regional ecosystem types and occurrence of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994 and subsequent amendments, as well as areas subject to the *Vegetation Management Act 1999*;
- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (national parks, conservation parks, resource reserves, nature refuges);
- any plant communities of cultural, commercial or recreational significance should be identified; and
- location and abundance of any exotic or weed species.

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

- site data shall be recorded using Queensland Herbarium methodology and proformas (*Methodology for survey and mapping of regional ecosystems and vegetation communications in Queensland,* Version 3.1):
- the minimum site size should be 10 by 50 metres;
- a complete list of species present at each site should be recorded;
- the relative abundance of plant species present should be recorded;
- any plant species of conservation, cultural, commercial or recreational significance should be identified;
- the finer scale vegetation mapping undertaken for the study (1:10,000 scale) should relate the API patterns and site data to the existing broad scale Queensland Herbarium Regional Ecosystem mapping. Where these are not congruent explanation should be provided and unusual or novel vegetation associations should be described and their conservation significance assessed;
- specimens of plant species of conservation significance (including endangered, vulnerable or rare taxa) should be submitted to the Queensland Herbarium for voucher purposes. These specimens shall be collected with sufficient information to enable their lodgement as vouchers as appropriate;
- plants not able to be identified by the botanist shall be submitted to the Queensland Herbarium for identification. These specimens shall be collected with sufficient information to enable their lodgement as vouchers as appropriate;

- two surveys for plant species of conservation significance shall be conducted to account for seasonal variability; and
- vegetation mapping should be undertaken between April and May to facilitate effective identification of species in structural layers.

4.7.1.2 Terrestrial fauna

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

- species diversity (i.e. a species list), 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;
- existence of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans); and
- use of the area by migratory birds, nomadic birds, fish and terrestrial fauna.

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

4.7.1.3 Aquatic biology

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

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

4.7.2 Potential impacts and mitigation measures

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

The EIS should address any actions of the project or likely impacts that require an authority under the *Nature Conservation Act 1992*, and/or would be assessable development for the purposes of the *Vegetation Management Act 1999*.

The discussion should cover all likely direct and indirect environmental harm due to the project on flora and fauna particularly sensitive areas as listed below (also see Attachment 2). Terrestrial and aquatic environments should also be covered. Also include human impacts and the control of any domestic animals introduced to the area.

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

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

The potential environmental harm to the ecological values of the area arising from the construction, operation and decommissioning of the project including clearing, salvaging or removal of vegetation should be described, and the indirect effects on remaining vegetation should be discussed. Short-term and long-term effects should be considered with comment on whether the impacts are reversible or irreversible. Mitigation measures and/or offsets should be proposed for adverse impacts. Any departure from no net loss of ecological values should be described.

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

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

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

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

4.8 Indigenous Cultural Heritage

Under Section 87 of the *Aboriginal Cultural Heritage Act 2003* a Cultural Heritage Management Plan (CHMP) is required when an EIS is undertaken.

In undertaking the CHMP the sponsor for the project must identify and endorse the relevant Aboriginal Parties for the project area. The sponsor must then seek agreement with the endorsed parties for the plan about how the project is to be managed with a view to avoiding harm to Aboriginal cultural heritage, and to the extent that harm can not reasonably be avoided, to minimise harm to Aboriginal cultural heritage. These negotiated agreements are to be set out in the CHMP.

4.8.1 Cultural Heritage Management Plans

The CHMP defines and describes the objectives and practical measures for protecting or enhancing cultural heritage environmental values, describes how nominated quantitative standards and indicators may be achieved for cultural heritage management, and how the achievement of the objectives will be monitored, audited and managed.

The environmental harm to cultural heritage values in the vicinity of the project should be managed under a CHMP developed specifically for the project. The CHMP will provide a process for the management of cultural heritage places both identified and sub-surface at the project sites. It is usual practice, although not mandatory, for the CHMP to be based on information contained in a Cultural Heritage Study (CHS). This information may include archaeological and/or anthropological reports on the survey area and cultural reports and/or information from affiliated traditional owners, and/or field survey data. The CHMP should address and include the following:

- a process for including Aboriginal/Torres Strait islander people associated with the development areas in protection and management of indigenous cultural heritage;
- processes for mitigation, management and protection of identified cultural heritage places and material in the project areas, including associated infrastructure developments, both during the construction and operational phases of the project;
- provisions for the management of the accidental discovery of cultural material, including burials;
- provisions for cultural awareness training or programs for project staff; and
- a conflict resolution process.

The development of the CHMP should be negotiated with the lead agency, the Department of Natural Resources and Water, and all stakeholder representatives, and where there is a role or responsibility identified for the Environmental Protection Agency, such as managing the EIS process under the EP Act, it should be party to the discussions.

Aspects of the above matters may be referred to the Land and Resources Tribunal and some may also involve native title considerations.

4.8.2 Cultural Heritage Studies

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

A Cultural Heritage Study (CHS) may be required as a precursor to agreeing on measures to protect Aboriginal Cultural Heritage in the CHMP. The CHS will need to identify and describe indigenous cultural heritage sites and places, and their values. The nature and scope of any such study must be agreed upon by the parties in advance and should include Aboriginal representatives of the endorsed parties. It may also include an appropriately qualified cultural heritage practitioner, where agreed by both parties.

The agreed nature and scope of the CHS may include, but need not be limited to, or absolutely inclusive of the following points where negotiated.

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

4.9 Non-Indigenous Heritage

4.9.1 Description of environmental values

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

A heritage study may be required that will describe non-indigenous historical heritage sites and places, and their values. Any such study must be conducted by an appropriately qualified cultural heritage practitioner in accordance with the *Queensland Heritage Act 1992* and must include the following:

- a systematic survey of the proposed development area to locate and record non-indigenous historical heritage places;
- significant assessment of any heritage sites/places located;
- the impact of the proposed development on 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 *Queensland Heritage Act 1992*, including notification provisions under section 56.

4.9.2 Potential impacts and mitigation measures

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

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

- processes for mitigation, management and protection of identified cultural heritage places and material in the project areas, including associated infrastructure developments, both during the construction and operational phases of the project;
- provisions for the management of the accidental discovery of cultural material, including graves, artefacts from previous mining activities and old workings; and
- heritage awareness training or programs for project staff.

The development of the CHMP should be discussed with the Cultural Heritage Branch of the Environmental Protection Agency, and endorsement of the management recommendations should be sought from the Agency.

Any collection of artefact material as part of a mitigation strategy will need to be done by an appropriately qualified cultural heritage practitioner holding a permit under provisions of the *Queensland Heritage Act 1992*. The EPA regional manager should be consulted for the provision of general advice including the appropriate conduct of cultural heritage surveys and the necessary permits.

4.10 Social

4.10.1 Description of environmental values

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

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

- community infrastructure and services, access and mobility;
- population and demographics of the affected community;
- local community values, vitality and lifestyles;
- recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;

- health and educational facilities;
- on farm activities near the proposed activities;
- current property values;
- number of properties directly affected by the project; and
- number of families directly affected by the project, this should include not only property owners but also families of workers either living on the property or workers where the property is their primary employment.

Describe the social values for the affected area in terms of the integrity of social conditions, including amenity and liveability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure.

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 Sections 4.8 Indigenous Cultural Heritage, 4.9 Non-Indigenous Cultural Heritage and 4.12 Economy.

4.10.2 Potential impacts and mitigation measures

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

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

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

The social impact assessment of the project is to be carried out in consultation with the Department of Communities. The assessment of impacts should describe the likely response of affected communities and identify possible beneficial and adverse impacts (both immediate and cumulative). These impacts should be considered both at the regional and local level.

The EIS should address the following matters:

- Include an assessment of impacts on local residents, current land uses and existing lifestyles and enterprises.
- Include an assessment of impacts on local and state labour markets, with regard to the source of the workforce. This information is to be presented according to occupational groupings of the workforce. In relation to the source of the workforce, information is required as to whether the proponent, and/or contractors, are likely to employ locally or through other means and whether there are initiatives for local employment opportunities.
- The EIS should address impacts of both construction and operational workforces and associated contractors on housing demand, community services and community cohesion. The capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the project is to be discussed.

- The assessment of impacts should take account of relevant demographic, social, cultural and economic profiles.
- Identify any new skills and training to be introduced in relation to the project. 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.
- Provide comment on how much service revenue and work from the project (e.g. provisioning, catering and site maintenance) would be likely to flow to existing communities in the area of the project.
- Include an assessment of impacts on existing local residents' values and aspirations.
- 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;
  - the access to existing human and commercial services and housing;
  - the ability to participate in regional and local employment and training opportunities; and
  - the new project workforce and their families.

For the construction and operational phases of the development, describe 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.

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

The educational impacts of the proposed development are to be analysed and described, particularly in regard to:

- primary, secondary and tertiary educational sectors;
- improved appreciation of conservation areas; and
- environmental education for the general public.

A program for the engagement of the affected landholders and/or the community for the project decommissioning and determining post mine land use, including use of infrastructure is to be addressed.

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

4.11 Health and safety

4.11.1 Description of environmental values

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

4.11.2 Potential impacts and mitigation measures

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

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

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

The EIS should address the project's potential for providing disease vectors. Measures to control mosquito and biting midge breeding should be described. Any use of recycled water should be assessed for its potential to cause infection by the transmission of bacteria and/or viruses by contact, dispersion of aerosols, and ingestion (e.g. via use on food crops). Similarly, the use of recycled water should be assessed for its potential to cause harm to health via the food chain due to contaminants such as heavy metals and persistent organic chemicals. Practical monitoring regimes should also be recommended in this section.

4.12 Economy

4.12.1 Description of environmental values

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

- economic viability (including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc); and
- historical descriptions of large-scale resource developments and their effects in the region.

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

4.12.2 Potential impacts and mitigation measures

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

An economic analysis, including a cost-benefit analysis, 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:

- the significance of this proposal on the local and regional economic context;
- the long and short-term beneficial (eg. job creation) and adverse (eg. competition with local small business) impacts that are likely to result from the development;
- the potential, if any, for direct equity investment in the project by local businesses or communities;
- the cost to all levels of government of any additional infrastructure provision;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);

- the potential economic impact of any major hazard identified in section 4.13;
- the distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

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

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

4.13 Hazard and risk

4.13.1 Description of environmental values

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

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

An environmental risk management register should be prepared which will identify and quantify risks related with the project. The register will list strategies to prevent, minimise and contain impacts. The risk assessment should include (but not be limited to) the following:

- risk associated with mining methods and equipment; and
- uncontrolled discharges to water (surface or groundwaters) and air due to system or catastrophic failure and the implications of such emissions for human health and natural ecosystems.

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

4.13.2 Potential impacts and mitigation measures

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

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

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

Details should be provided of:

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

The proponent should develop a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis (eg HAZOP Guidelines, NSW Department of Urban Affairs and Planning(DUAP)). The assessment should outline the implications for and the impact on the surrounding land uses, and should involve consultation with Department of Emergency Services, Queensland Fire and Rescue Authority, and Queensland Ambulance Service. The preliminary hazard analysis should incorporate:

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

The plan should include the following components:

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

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

4.14 Cross-reference with the terms of reference

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

5.0 References

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

6.0 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. Environmental management plan

The environmental management plan (EM Plan) should be developed from the mitigation measures detailed in part 4 of the EIS. Its purpose is to set out the proponents' commitments to environmental management. That is, how environmental values will be protected and enhanced.

The EM plan is an integral part of 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 proponents' commitments to acceptable levels of environmental performance, including environmental objectives, i.e. levels of expected environmental harm, performance standards and associated measurable indicators, performance monitoring and reporting;
- impact prevention or mitigation actions to implement the commitments; and
- corrective actions to rectify any deviation from performance standards.

Through the EM plan, the EIS's commitments to environmental performance can be used as regulatory controls through conditions to comply with those commitments. Therefore, the EM plan is a relevant document for project approvals, environmental authorities and permits, and may be referenced by them.

For further information, see the EPA guideline *Preparing environmental management plans*.

A3. Development approvals

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

A4. Study team

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

A5. 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.

A6. 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.

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;
- waterway hydrology;
- groundwater;
- flora and fauna studies;
- economic studies, Cost-Benefit Analysis; and
- hazard and risk studies.

A8. Research

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

7.0 Attachments

Attachment 1—Legislation administered by the EPA

Attachment 1 provides a comprehensive list of legislation (Acts, Regulations, Plans). Some of this legislation may be relevant to environmental impact assessment and related approvals. The legislation that directly involves an approval process or requirement is marked in bold text.

The Environmental Protection Agency administers all or parts of the following legislation and subordinate legislation:

Acts:

Aboriginal Land Act 1991(s 83(2)-(11))
Coastal Protection and Management Act 1995
Currumbin Bird Sanctuary Act 1976
Environmental Protection Act 1994
Gurulmundi Secure Landfill Agreement Act 1992
Integrated Planning Act 1997 (when acting as alternative assessment manager)
Marine Parks Act 1982
National Environment Protection Council (Queensland) Act 1994
National Trust of Queensland Act 1963
Nature Conservation Act 1992
Newstead House Trust Act 1939
Queensland Heritage Act 1992
Recreation Areas Management Act 1988
Torres Strait Islander Land Act 1991 (s 80(2)-(11); s 131)
Transport Infrastructure Act 1994 (ss 233 and 236)
Tweed River Entrance Sand Bypassing Project Agreement Act 1998

Note: See www.legislation.qld.gov.au for copies of the above.

Regulations, policies, by-laws, orders, plans, notices:

Coastal Management Control Districts (Requirements for Buildings or Other Structures) Regs 1984
Coastal Management Control Districts (Building and Subdivision of Land Applications) Regulations 1984
Environmental Protection Regulation 1998
Environmental Protection (Interim) Waste Regulation 1996
Environmental Protection (Air) Policy 1997
Environmental Protection (Noise) Policy 1997
Environmental Protection (Waste Management) Policy 2000
Environmental Protection (Waste Management) Regulation 2000
Environmental Protection (Water) Policy 1997
Gurulmundi Secure Landfill By-law 1992
Integrated Planning Regulation 1998
Marine Parks (Declaration) Regulation 2006
Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004
Marine Parks (Great Sandy) Zoning Plan 2006
Marine Parks (Moreton Bay) Zoning Plan 1997
Marine Parks Regulation 2006
Nature Conservation (2006 Macropod Harvest Period) Notice 2005
Nature Conservation (Administration) Regulation 2006
Nature Conservation (Dugong) Conservation Plan 1999
Nature Conservation (Forest Reserves) Regulation 2000
Nature Conservation (Koala) Conservation Plan 2006
Nature Conservation (Macropod) Conservation Plan 2005
Nature Conservation (Problem Crocodiles) Conservation Plan 1995
Nature Conservation (Protected Areas) Regulation 1994
Nature Conservation (Protected Areas Management) Regulation 2006
Nature Conservation (Protected Plants) Conservation Plan 2000
Nature Conservation (Protected Plants Harvest Period) Notice 2006

Nature Conservation (Whales and Dolphins) Conservation Plan 1997
Nature Conservation (Wildlife) Regulation 2006
Nature Conservation (Wildlife Management) Regulation 2006
Queensland Heritage Regulation 1992
Recreation Areas Management By-law 1991
Recreation Areas Management Regulation 1989
Wet Tropics Management Plan 1998

Attachment 2—Sensitive areas or areas identified for management

These areas refer to locations, places or areas, however large or small, that have environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historic or cultural heritage, or are important in providing amenity, harmony or sense of community. They may be recognised through statutory provisions and site-specific determinations. The list, while comprehensive, is only indicative of possible sensitive areas.

Land Area Classification	**Administering Legislation**	**Administrator (Qld)**
Aboriginal freehold land	*Aboriginal Land Act 1991 and Torres Strait Islander Land Act 1991*	Dept. of Natural Resources and Mines
Aboriginal national parks	*Aboriginal Land Act 1991*	Dept. of Natural Resources and Mines
National parks	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Conservation parks	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Coordinated conservation areas	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Wilderness areas	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Nature refuge	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Areas of critical habitat or areas of major interest identified under a conservation plan, areas subject to an interim conservation order and endangered ecosystems	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
World Heritage management areas	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
International agreement area	*Nature Conservation Act 1992*	Environmental Protection Agency
Queensland marine parks (general use zones)	*Marine Parks Act 1982*	Qld Parks and Wildlife Service
Resource reserves	*Nature Conservation Act 1992*	Qld Parks and Wildlife Service
Catchments or watercourses; groundwater resources and recharge areas; lakes and developed surface water resources the subject of Water Resource Plans, Land and Water Management Plans, and/or declared catchment area.	*Water Act 2000*	Dept. of Natural Resources and Mines
Historic mining site	Inter-Departmental notifications.	Environmental Protection Agency

Land Area Classification	Administering Legislation	Administrator (Qld)
Registered heritage place, cultural heritage place, protected area, or restricted zone	*Aboriginal Cultural Heritage Act 2003, Torres Strait Islander Cultural Heritage Act 2003* *QLD Heritage Act 1992*	Dept. of Natural Resources and Mines Environmental Protection Agency
Designated landscape area places of cultural heritage significance	*Aboriginal Cultural Heritage Act 2003, Torres Strait Islander Cultural Heritage Act 2003*	Dept. of Natural Resources and Mines
State forest, timber reserve including state forest, feature protection area, state forestry park, state forest scientific area	*Forestry Act 1959*	Dept. of Natural Resources and Mines
Areas containing marine plants; declared Fish Habitat Areas	*Fisheries Act 1994*	Dept. of Primary Industries & Fisheries
DPI research site	Inter-Departmental Agreement	Dept. of Primary Industries & Fisheries
Community reserves, or critical areas	*Land Act 1994* & local tree clearing guidelines	Environmental Protection Agency and Dept. of Natural Resources and Mines
World heritage area	*World Heritage Properties Conservation Act*	Dept. of Environment and Heritage (Commonwealth)
Wet tropics	*Wet Tropics World Heritage Protection and Management Act*	Wet Tropics Management Authority
Great Barrier Reef and zones for protection of biological values	*Great Barrier Reef Marine Park Act*	Great Barrier Reef Marine Park Authority
Control Districts, key coastal sites and designated areas, areas under Coastal Management Plans	*Coastal Protection and Management Act 1995*	Environmental Protection Agency
Areas prescribed by State Planning Policies	Various areas declared through State Planning Policies eg. Koala Coast	Relevant State Government Agency eg. Environmental Protection Agency
Erosion Prone Areas and Coastal Management Control Districts	*Beach Protection Act 1968*	Environmental Protection Agency
Areas listed under international agreements and treaties, areas subject to World Heritage listing, critical habitat, areas containing migratory species, conservation agreement areas, and protected areas.	Various Agreements, Conventions and Treaties *Environment Protection and Biodiversity Conservation Act 1999*	Commonwealth Government Dept. of Environment and Heritage (Commonwealth)

Land Area Classification	Administering Legislation	Administrator (Qld)
Areas identified in planning schemes developed under Schedule 1 of the Integrated Planning Act	*Integrated Planning Act 1997*	Dept. of Local Government and Planning. Individual local governments.
Areas listed or interim listed on the Register of the National Estate	*National Heritage Commission Act*	Dept. of Environment and Heritage (Commonwealth)
Aboriginal and Torres Strait Islander owned land and identified interests (including areas in respect of which a claim under the Native Title Act has been registered by the National Native Title Tribunal).	*Native Title Act 1993,* *Aboriginal Land Act 1991,* *Torres Strait Islander Act 1991,* *Community Services (Aboriginal) Act 1984,* and *Community Services (Torres Strait Islander) Act 1984*	Dept. Premier and Cabinet Dept. of Natural Resources and Mines Dept. of Natural Resources and Mines Dept. of Family, Youth and Community Care.
Areas prescribed in Special Agreement Acts.	Various special agreement Acts	Dept. State Development and Innovation or other authorities as above
Areas identified through recognised environmental impact assessment processes for specific development proposals, such as State Development Areas.	*EP Act, State Development Public Works Organisation Act 1971, IPA* and other Acts above.	Dept. State Development and Innovation, Environmental Protection Agency, Department of Local Government and Planning or other authorities as above.
Freehold land containing native vegetation.	*Vegetation Management Act 1999*	Dept. of Natural Resources and Mines