

# Red Hill Mining Lease Project:

## Terms of reference for an environmental impact statement

September 2013

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# Preamble

## About the project

BHP Billiton Mitsubishi Alliance (BMA), through its joint venture manager, BM Alliance Coal Operations Pty Ltd, proposes to convert the existing Red Hill Mining Lease Application (MLA 70421) to enable the continuation of existing mining operations associated with the Goonyella Riverside and Broadmeadow (GRB) complex. Specifically, the mining lease conversion will allow for:

- an extension of three long-wall panels (14, 15 and 16) of the existing Broadmeadow underground mine (BRM)
- a future incremental expansion option of the existing Goonyella Riverside Mine (GRM)
- a future Red Hill Mine (RHM) underground expansion option located to the east of the GRM complex, which includes development of key infrastructure.

The three project elements described above are collectively referred to as 'the project'.

The Red Hill Mining Lease is located adjacent to the existing GRB mine complex in the Bowen Basin, approximately 30 kilometres (km) north of Moranbah and 220 km south-west by road from Mackay, Queensland.

The conversion of the Red Hill Mining Lease is of strategic importance to the planning and development of existing operations within and around the existing GRB complex. It is anticipated that development for future mining of panels 14, 15 and 16 associated with the BRM will commence in financial year (FY) 2016. The mining of these extensions will utilise the existing mine infrastructure and workforce, and extend the life of mine (LOM) by approximately one year.

The timing for commencement, the rate of development and scale of future production on the Red Hill Mining Lease has not been determined and is subject to the owner's approvals. At full production, the RHM has the potential to produce up to 14 million tonnes per annum (mtpa) of high quality hard coking coal over a life of 20–25 years. Under this scenario, the potential capacity of the extended complex (GRB and RHM) would be up to approximately 32 mtpa.

For further information on the project, refer to the project initial advice statement, which is available at: [www.dsdip.qld.gov.au/redhill](http://www.dsdip.qld.gov.au/redhill)

## Purpose of this document

These terms of reference (TOR) set out the matters to be addressed in an environmental impact statement (EIS) for the project. On 17 June 2013, the Coordinator-General declared the project to be a 'coordinated project' under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act). This declaration initiated the statutory environmental impact assessment procedure of Part 4 of the SDPWO Act, which requires the proponent to prepare an EIS for the project.

This TOR must be read in conjunction with *Preparing an environmental impact statement: Guideline for proponents*, which explains the following:

- the target audience for the EIS
- stakeholder consultation requirements
- document format
- copy requirements.

The guideline is available from [www.dsdip.qld.gov.au](http://www.dsdip.qld.gov.au) or from the EIS project manager

## Australian Government assessment

The project has been referred to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (Commonwealth Environment Minister). On 20 June 2013, the Commonwealth Environment Minister's delegate determined that the project is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cwlth) due to the likely potential impacts on a matter of national environmental significance. The controlling provision under the EPBC Act is:

- sections 18 and 18A (listed threatened species and communities).

As a consequence, the project requires assessment and approval under the EPBC Act. The Australian Government has accredited this EIS process to be conducted under the SDPWO Act, under section 87(4) of the EPBC Act. This will enable the EIS to meet the impact assessment requirements under both Commonwealth and Queensland legislation. This TOR reflects issues that the Commonwealth Environment Minister would expect to be addressed as part of an assessment under an EIS process.

The project will require approval from the Commonwealth Environment Minister under Part 9 of the EPBC Act, before it can proceed. The Department of State Development Infrastructure and Planning (DSDIP) has invited relevant Commonwealth, state and local government representatives, and other relevant authorities, to participate in the impact assessment process as advisory agencies.

The proponent will prepare an EIS to address the TOR. Once the EIS has been prepared to the satisfaction of the Coordinator-General, a public notice will appear in relevant newspapers circulating in the region and nationally. The notice will state where copies of the EIS can be viewed or purchased, the submission period, and where submissions should be sent. The proponent may also be required to prepare additional information about the EIS, to address specific matters raised during the EIS submission period.

## Coordinator-General's report

At the conclusion of the EIS process, the Coordinator-General will prepare a report evaluating the EIS (Coordinator-General's report). If the report states conditions under the following Queensland Acts, the Coordinator-General is required to provide the responsible minister(s) with a copy of the report:

- 
- *Mineral Resources Act 1989*
  - *Environmental Protection Act 1994 (EP Act)*
  - *Petroleum and Gas (Production and Safety) Act 2004*
  - *Greenhouse Gas Storage Act 2009.*

As the project is a 'controlled action' under the EPBC Act, the Coordinator-General will provide a copy of the report to the Commonwealth Environment Minister. Refer to pages 57–60 for more information on Australian Government requirements.

# Content of the EIS for State matters

This section details the matters to be assessed by the Coordinator-General on behalf of the State of Queensland.

The EIS should generally follow the format and content outlined in this TOR. Discuss any proposed change to the overall structure of the EIS documents with the EIS project manager.

## 1. Executive summary

The executive summary should convey the most important and preferred aspects and options relating to the project in a concise and readable form. It should use plain English, avoid jargon, be written as a stand-alone document and be structured to follow the EIS. It should be easy to reproduce and distribute on request to those who may not wish to read or purchase the whole EIS.

The executive summary should include:

- a brief description of the project (pre-construction, construction, operational activities and decommissioning) and the existing environment, using visual aids where appropriate
- the proponent's name and contact details
- a discussion of any relevant projects previously undertaken by the proponent, if applicable, and the proponent's commitment to effective environmental management
- project need and alternatives, including the consequences of not proceeding with the project and an outline of the alternative options considered and reasons for selecting the proposed development option
- stakeholders and consultation
- approval process
- environmental assessment and management, including an outline of the principal environmental impacts predicted and the proposed environmental management strategies, commitments and rehabilitation strategies to minimise the significance of these impacts
- rehabilitation
- environmental management and monitoring
- an assessment of cumulative impacts in relation to social, economic and environmental factors of associated infrastructure projects proposed within the region
- project benefits
- a concise statement of the aims and objectives of the project
- the legal framework for the project, decision-making authorities and advisory agencies.



## **2. Glossary of terms**

Provide a glossary of technical terms, acronyms, abbreviations and references.

## **3. Introduction**

Clearly explain the function of the EIS, why it has been prepared and what it sets out to achieve. Include an overview of the structure of the document.

### **3.1. The project**

Briefly describe the key elements of the project with illustrations or maps. Summarise any major associated infrastructure requirements. Provide detailed project descriptions in Section 4 of this TOR (refer to page 9).

### **3.2. Existing mine complex**

Describe the site context and proposed interaction in relation to the existing GRB mining complex located directly adjacent to the Red Hill Mining Lease (MLA 70421).

### **3.3. The proponent**

Describe the proponent's experience, including:

- the nature and extent of business activities, including details of any joint venture partners experience and qualifications
- environmental record, including a list of any breach of relevant environmental laws (Queensland and the Commonwealth of Australia) during the previous ten years
- the proponent's environmental, health, safety and community policies.

### **3.4. Project outline**

Provide an overview of the project to put it into context. Include:

- a rationale explaining the selection of the preferred operating scenario, including details such as cost, environmental impacts, and the operational efficiencies of each option
- a description of the key components of the project including the use of text and design plans where applicable
- a summary of any environmental design features of the project, estimates of cost, timing, and overall duration of the project, including details of and justification for, any staging of the development.

### **3.5. Project rationale**

Describe the specific objectives and justification for the project, including its strategic, economic, environmental and social implications, technical feasibility and commercial drivers. Discuss the status of the project in a regional, state and national context.

Explain the project's compatibility with relevant policy, planning and regulatory frameworks.

## **3.6. Relationship to other projects**

Describe how the project relates to other major projects (of which the proponent should reasonably be aware) that have been, are being undertaken or that have been proposed or approved in the area potentially affected by the project. Include details of dependencies on and projected timing of other major projects identified.

As a result of this assessment, there may be opportunities to co-locate existing or proposed infrastructure, enabling efficiency gains and mitigating environmental and property impacts. Where co-location may be likely, outline opportunities to coordinate or enhance impact mitigation strategies. Discuss the opportunities in sufficient detail to enable the reader to understand the reasons for preferring certain options or courses of action and rejecting others.

## **3.7. Project alternatives**

Describe feasible alternatives including conceptual, technological and locality alternatives to the proposed project and the consequences of not proceeding with the project (including any impacts that would be avoided). Detail the criteria used to determine the alternatives and provide sufficient detail to convey why certain options or courses of action are preferred and why others are rejected (including the 'no action' option). Discuss the interdependencies of project components, particularly in regard to how any infrastructure requirements relate to the viability of the project.

This information is required to assess why the scope of the project is as it is and to ensure that the environmentally sustainable design principles and sustainable development aspects were considered and incorporated during the project's scoping phase.

A comparative description of the relevant impacts of each alternative on the matters of state and national environmental significance must be provided, including alternate locations for project infrastructure. Sufficient detail must be provided to make clear why any alternative is preferred to another.

## **3.8. The environmental impact assessment process**

### **3.8.1. EIS objectives**

Provide a statement of the objectives of the environmental impact assessment process. The structure of the EIS can then be outlined and used to explain how the EIS will meet its objectives. The purpose of the EIS is to:

- provide public information on the need for the project, alternatives to it, assess options and make informed decisions for its implementation
- present the likely effects of the project on the natural, social and economic environment
- demonstrate how environmental impacts can be avoided, managed or mitigated and the offsets for any residual impacts
- provide information to formulate the project's management of environmental impacts.

### 3.8.2. EIS methodology

Describe the EIS process steps, including the role of the EIS in the Coordinator-General's decision making process and the Department of Sustainability Environment Water Population and Communities (SEWPaC) decision process. Include information on relevant stages of EIS development, timing, statutory and public consultation requirements and any interdependencies that exist between approvals sought. The information in this section is required to ensure:

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

### 3.8.3. Submissions

Inform the reader how and when properly made public submissions on the EIS will be addressed and taken into account in the decision-making process. Indicate points in subsequent approval processes for the project (for example, 'material change of use' (MCU) applications under the *Sustainable Planning Act 2009* (SPA)) where submitters may have appeal rights. The EIS project manager can assist with preparing information on the submissions process.

## 3.9. Public consultation process

The public consultation process should provide opportunities for community involvement and education. It may include interviews with individuals, public communication activities, interest group meetings, printed material and other mechanisms to encourage and facilitate active public consultation. The public consultation processes (community engagement) for all parts of the EIS should be integrated.

Consultation with advisory agencies should be the principal forum for identifying legislation, regulations, policies and guidelines relevant to the project and EIS process.

### 3.9.1. Consultation plan

Develop and implement a comprehensive and inclusive consultation plan.

The consultation plan should identify broad issues of concern to local and regional community and interest groups and address issues from project planning through commencement, project operations and decommissioning. The consultation plan should identify:

- the stakeholders to be targeted
- the topics to be consulted on with stakeholders
- the types of consultation and communication activities to be undertaken
- timing of activities
- how consultation activities will be integrated with other EIS activities and the project
- development process

- consultation responsibilities
- communication protocols
- reporting and feedback arrangements
- how results of consultation will be considered by the proponent and integrated into the EIS process.

### **3.9.2. Public consultation report**

Include a public consultation report detailing how the public consultation plan was implemented, and the results. It must include:

- a list of stakeholders identified, including the Australian and Queensland governments, local government agencies, and/or the affected persons (as defined under the EP Act)
- criteria for identifying stakeholders and methods used to communicate with them, details of the activities conducted to date and the future consultation strategies and programs, including those during the operational phase of the project
- a matrix displaying the topics consulted against the list of stakeholders to show stakeholders with multiple issues of concern
- a summary of the issues raised by individual stakeholders and/or multiple groups of stakeholders and the means by which the issues have been addressed
- details of how consultation involvement and outcomes were integrated into the EIS process
- details of how consultation outcomes will be integrated into future site activities (including opportunities for engagement and provision for feedback and action if necessary).

## **3.10. Project approvals**

### **3.10.1. Legislation and approvals**

List and describe Australian, state and local legislation, approvals and plans relevant to the planning, approval, construction and operation of the project. Indicate any legislation or approval considered to be binding on key government agencies, following consultation, and how the resultant impact is to be considered. (Note: It is the responsibility of the proponent (or its consultants) to address the requirements of new or amended legislation, policies, plans or guidelines that come into effect after these TOR have been finalised, regardless of whether or not the legislation or policies are covered in these TOR.)

### **3.10.2. Relevant plans**

Outline the project's consistency with the existing national, state, regional and local planning framework that applies to the project location. Refer to all relevant statutory and non-statutory plans, planning policies, guidelines, strategies and agreements.

### 3.10.3. Environmentally relevant activities

Describe any activity that would be a prescribed environmentally relevant activity (ERA) if it were not otherwise undertaken on a mining/petroleum lease. Identify and describe all ERAs that would be undertaken at the project site including those that would otherwise require a development approval if the project was not covered by an environmental authority for a mining or petroleum activity. Present a detailed description of each ERA in Section 5, Environmental values and management of impacts. Provide details of the impact on land, water, air, noise and any other identified environmental values, as well as a detailed description of the waste generated from each ERA and its quantity, characteristics, handling, storage, management and intended treatment and disposal.

### 3.10.4. Commonwealth obligations

Identify and outline relevant Commonwealth obligations relating to the protection of listed threatened species and communities (Biodiversity Convention, Apia Convention, Convention on International Trade in Endangered Species of Wild Fauna and Flora). Please also identify and outline how the proposed action (including avoidance, mitigation and offset measures where relevant) is not inconsistent with a Recovery Plan, Threat Abatement Plan or Conservation Advice for each relevant listed threatened species or community. See 'Content of the EIS for matters of national environmental significance' on pages 57–60, for information required to assess impacts on listed threatened species and communities under the EPBC Act.

## 4. Project description

### 4.1. Overview of the proposed project

Provide an overview of the project to put it into context. Include:

- a rationale explaining the selection of the preferred operating scenario, including details such as cost, environmental impacts, and the operational efficiencies of each option
- a description of the key components of the project including the use of text and design plans where applicable
- a summary of any environmental design features of the project
- a reference case which describes a scenario for development of the project components including estimated cost, timing, and overall duration of the project, including details of and justification for, any preliminary plans for staging of the development.

### 4.2. Project timing

Describe a scenario for the construction elements of the project, including:

- an indicative construction timetable, including start-up dates and hours of construction, and details of the timing and duration of major works programs

involving a substantial increase in workforce and the movement of materials that may impact traffic movement on major arterial roads

- major work programs for the construction phase
- construction equipment to be used
- construction inputs, handling and storage including an outline of potential locations for source of construction materials
- major hazardous materials to be transported, stored and/or used on-site, including
  - environmental toxicity data and biodegradability
  - clean-up and restoration of areas used during construction, including camp site(s)
  - storage areas.

### **4.3. Mining tenure**

Describe and illustrate all existing mining and exploration tenures for minerals, petroleum (including coal seam gas), geothermal and greenhouse gas tenures and licences overlying and adjacent to the project site, and any proposed applications required for this project under the Mineral Resources Act 1989 and the Petroleum and Gas (Production and Safety) Act 2004.

Describe in detail any issues related to the overlap of tenements and tenures for different resources or purposes, including the sequential exploitation of the resources or uses to which the tenements and tenures may be put.

### **4.4. Mineral resources**

Summarise the results of studies and surveys undertaken to identify the mineral and natural resources required to implement the proposal. Provide specific details of the following:

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

Provide a description of the existing operations in the context of its potential overlap with the proposed Red Hill Mining Lease.

### **4.5. Proposed underground mining operations**

Describe the indicative staging and timeframes for any construction activities in relation to each project element.

Provide an estimate of the number and roles of persons to be employed during any construction phases of the project.

## 4.6. Surface infrastructure and facilities

Detail, with the aid of concept and layout plans, requirements for new infrastructure or upgrading/relocating existing infrastructure to service the project. Consider infrastructure such as road transportation, water supply and storage, energy supply, telecommunications, stormwater, waste disposal and sewerage.

Describe:

- all infrastructure required to be constructed, upgraded, relocated or decommissioned for the construction and/or operation of the project, such as resource extraction areas, access roads, power supply, connection to sewerage or water supply
- the design and construction standards to be met (for example, waterway crossings should be designed to meet the requirements of the *Fisheries Act 1994* and self-assessable codes for minor or temporary water barrier works)
- alternative approaches or the opportunity to obtain materials from alternative sources
- location of existing infrastructure such as the State-controlled road network, and local roads as relevant to the site.

Identify if the associated infrastructure is being designed, built, upgraded or relocated by the proponent or a third party. If a third party, state who and if an environmental assessment has or will be done as part of the separate approval process.

## 4.7. Incidental mine gas management

Describe the method proposed for drainage of incidental mine gas and associated activities including ventilation and goaf methane management.

## 4.8. Water management

Provide information on proposed water usage and storage by the project, including the quality and quantity of all water supplied to, or captured at, the site. Provide a mine water balance. In particular, describe the proposed and optional sources of water supply such as mine dewatering, capture of overland flow, taking from a watercourse, bores, coal seam gas water and any surface storages such as dams and weirs and municipal water supply pipelines.

Describe the options for supplying water to the project, and assess the consequential impacts in relation to any water resource plan and resource operations plan that may apply.

Any proposed water conservation and management measures should be described. Describe any approvals and water allocations the project may need under the Water Act for water supply and storage.

Estimate potable water demand for the project, including the temporary demands during the construction period. Provide details of any existing potable water supply, including town water, which would meet the requirements. If water storage and treatment is proposed on site for use by the site workforce, describe the method of

treatment and storage. Describe any waste streams from water treatment, and assess the potential impacts of disposal in the appropriate sections of the EIS.

For any proponent supplied infrastructure, describe the process and criteria used to select the preferred design and preferred construction techniques, including the following (if applicable):

- the method of extracting and/or releasing water from a storage
- any treatment methods proposed
- if distribution is by pipe:
  - provision for route refinement and right of way
  - pipeline design parameters, including capacity and design life
  - above-ground facilities—physical dimensions and construction materials for surface facilities along the pipeline route, including information on pipeline markers
  - any project facilities and linkages to existing water supply infrastructure along the pipeline route
  - design measures to prevent inter-basin transfer of aquatic flora and fauna.

Provide a description of the proposed stormwater drainage system and the proposed disposal arrangements, including any off-site or integrated management systems or services. Illustrate the description with figures and contours at suitable intervals showing drainage pathways, including the separate pathways for any natural and mine-affected surface run-off respectively, any stream diversions, and the locations and discharge points of any sediment detention basins, and any other stormwater quality improvement devices. In particular, address how stormwater would be kept separate from any mine-affected water.

## **4.9. Construction phase**

Describe, include using a map(s) of a suitable scale, all pre-construction activities, including nature, scale and timing of:

- land acquisitions required, be it in full or as easements or leases
- vegetation clearing
- site access
- earthworks
- interference with watercourses and floodplain areas, including wetlands
- site establishment requirements for construction facilities, including access measures, movement of materials and equipment, and expected size, source and control of the construction workforce accommodation, services (water, sewerage, communication, energy, medical, waste disposal, recreation) and safety requirements
- temporary works
- upgrade, relocation, realignment, deviation of or restricted access to roads and other infrastructure
- equipment to be used.



### 4.9.1. Program of works

Describe all the construction elements of the project, including:

- an indicative construction timetable, including expected commissioning and start-up dates and hours of construction
- major work programs for the construction phase, including an outline of construction methodologies
- construction equipment to be used
- construction inputs, handling and storage including an outline of potential locations for source of construction materials
- major hazardous materials to be transported, stored and/or used on site, including environmental toxicity data and biodegradability
- clean-up and restoration of areas used during construction, including camp site(s) and storage areas.

### 4.9.2. Commissioning

Describe the commissioning process including the associated environmental impacts.

## 4.10. Operational phase

Provide full details of the operation for all elements of the project, including:

- a description of the project site, including concept and layout plans of buildings, structures, plant and equipment to be employed
- nature and description of all key operational activities
- the capacity of the project equipment and operations
- estimated numbers and roles of persons to be employed during the operational phase of the project.

## 4.11. Rehabilitation and decommissioning

This section should present general strategies and methods for decommissioning of the project and rehabilitation of the project site, including:

- a preferred rehabilitation strategy including measures aimed at minimising the amount of land disturbed at any one time and minimise the residual loss of land with ecological or productive value
- the final topography of any excavations, subsidence areas waste areas and dam sites, including maps at a suitable scale
- options and proposed methods for disposing of wastes from the demolition of project infrastructure, with sufficient detail to allow the feasibility and suitability of the method to be considered
- future land tenure arrangements following decommissioning
- a strategy to ensure current and future surface and groundwater quality is maintained at levels that are acceptable for potentially affected users

- a strategy to rehabilitate affected watercourses, including removal of any redundant waterway barriers
- completion criteria for the project site in accordance with *Guideline: Rehabilitation Requirements for Mining Projects* (Department of Environment and Heritage Protection 2012a)
- proposed rehabilitation objectives for the site linked to specific completion criteria, including rehabilitation indicators that will be measured to establish when rehabilitation is complete.

Describe the options, strategic approaches and methods for progressive and final rehabilitation of the environment disturbed by the project. Include measures to identify success, thresholds for intervention (including intervention measures) and timeframes for which activities will be undertaken.

Evaluate the compliance of the strategies and methods for progressive and final rehabilitation of disturbed areas with the objectives of the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (Department of Minerals and Energy 1995) and *Guideline: Rehabilitation Requirements for Mining Projects* (Department of Environment and Heritage Protection 2012a). In particular, the strategies and methods are to have the following objectives:

- mining and rehabilitation should aim to create a landform with the same or similar land-use capabilities and/or suitability it had prior to the disturbance, unless other beneficial land uses are pre-determined and agreed
- mine wastes and disturbed land should be rehabilitated so that it is self-sustaining or to a condition where the maintenance requirements are consistent with an agreed post-mining land use
- current and future water quality should be maintained at levels that are acceptable for users and environments downstream of the site
- surface waters such as final voids or dams retained on the lease should be safe, self-sustaining and be of quality fit for the final uses.

Describe the means of decommissioning the project by removing or reusing plant, equipment, structures, buildings, concrete footings and foundations, hardstand areas and storage tanks. Describe the proposed methods for stabilising the affected sites. Discuss options and methods for the disposal of wastes from the demolition of plant and buildings in sufficient detail for their feasibility and suitability to be assessed.

Describe any proposals to divert creeks during operations and, if applicable, the reinstatement of the creeks after operations have ceased. Describe the management and ongoing monitoring of the impacts of subsidence. Rehabilitation would involve the re-establishment of vegetation communities along watercourses similar to the pre-cleared regional ecosystems in those areas.

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

Describe and illustrate where final voids and uncompacted overburden and workings at the end of mining would lie in relation to flood levels up to and including a range of flood levels for the locality.

Describe topsoil management including addressing minimising topsoil storage times (to reduce fertility degradation) and the transportation, storage and replacement of topsoil to disturbed areas.

Discuss the preferred rehabilitation strategy with particular regard to final landform stability, vegetation cover, rehabilitation of plants and the long-term quality of water in any final voids. Include appropriate post-mining surface and groundwater quality and quantity monitoring regimes. Address implications for the long-term safety, stability and environmental risk of the site, particularly with regard to the on-site disposal of waste and the site's inclusion on the Environmental Management Register (EMR) or the Contaminated Land Register (CLR).

Refer to infrastructure that is not intended to be decommissioned. In this situation, describe the entity to which the infrastructure is intended to be transferred, and the proposed environmental management regimes.

## 5. Environmental values and management of impacts

Detail the environmental protection and mitigation measures incorporated in the planning, construction, rehabilitation, commissioning, operations and decommissioning of all facets of the project. Measures should prevent, or if not possible, minimise environmental harm and maximise environmental benefits of the project. Identify and describe preferred measures in more detail than other alternatives.

The objectives of the following sections are to:

- describe the existing environmental values of the area that may be affected by the project, using background information and/or new studies to support statements (include reference to all definitions of environmental values set out in relevant legislation, policies and plans)
- describe the potential adverse and beneficial impacts of the project on the identified environmental values and the measures taken to avoid, minimise and/or mitigate those impacts
- describe any cumulative impacts on environmental values caused by the project, either in isolation or in combination with other known existing or planned projects
- present objectives, standards and measurable indicators that protect the identified environmental values
- examine viable alternative strategies for managing impacts (present and compare these alternatives in view of the stated objectives and standards to be achieved)
- discuss the available techniques to control and manage impacts in relation to the nominated objectives.

Where negative impacts of the project cannot be avoided, or adequately minimised or mitigated, present proposals to offset impacts in accordance with the Queensland Government Environmental Offsets Policy (Environmental Protection Agency 2008b).

The mitigation measures and monitoring programs, identified in this section of the EIS, should be used to develop impact management strategies for the project.

## **5.1. Climate, natural hazards and climate change**

Describe the climatic conditions that may affect management of the project. This includes a description of the vulnerability of the project area to seasonal conditions, extremes of climate (for example, cyclones) and natural or induced hazards (including bushfire and floods). Provide a risk assessment (as part of the requirements of Subsection 8.1 of this TOR) and a management plan detailing these potential climatic threats to the construction, and operation of the project. Include the following:

- a risk assessment of changing climate patterns that may affect the viability and environmental management of the project
- the preferred and alternative adaptation strategies to be implemented
- commitments to working cooperatively, where practicable, with government, other industry and other sectors to address adaptation to climate change.

Address the most recent information on potential impacts of climatic factors in the appropriate sections of the EIS.

### **5.1.1. Flood management**

Due to the location of the site, a comprehensive flood study should be included in the EIS for a range of flood events and include:

- quantification of flood impacts on the project site and on properties surrounding and external to the project site from redirection or concentration of flows
- identification of likely increased flood levels, increased flow velocities or increased time of flood inundation as a result of the development
- identification of likely increased flood levels, increased flow velocities or increased time of flood inundation as a result of the modelled changes to climate conditions, including the frequency of severe weather events.

The flood study should address any requirements of local or regional planning schemes for flood-affected areas. The study report should include details of all calculations along with descriptions of base data, any potential for loss of flood plain storage, and triangulated surface meshes produced in terrain modelling software.

Reference must be made to any studies undertaken by the local council in relation to flooding.

## 5.2. Land

### 5.2.1. Land use

Detail the existing land environment values for all areas associated with the project. Describe the potential for the construction and operation of the project to change existing and potential land uses of the project sites and adjacent areas.

#### Description of environmental situation

Identify, with the aid of maps:

- land tenure, including reserves, tenure of special interest (such as protected areas and forest reserves), existing and proposed gas infrastructure, water pipelines, powerlines and transport corridors, including local roads, state-controlled roads, stock routes and rail corridors
- existing land uses and facilities surrounding the project
- distance of the project from residential and recreational areas
- declared water storage catchments
- location of the project in relation to environmentally sensitive areas.

#### Potential impacts and mitigation measures

Detail the potential for the construction, operation and decommissioning phases of the project to change existing and potential land uses of the project site including adjacent and other affected areas. In particular, describe the following:

- impacts on the project site and adjacent land uses and human activities and strategies for mitigation, such as those required by:
  - State Planning Policy 1/92: Development and the Conservation of Agricultural land (Department of Primary Industries and Department of Housing, Local Government and Planning 1992) and *Planning guidelines: The identification of good quality agricultural land* (Department of Primary Industries & Department of Housing, Local Government and Planning 1993) or any relevant state planning policies
  - State Planning Policy 2/07: Protection of Extractive Resources (Department of Mines and Energy 2007a) or any relevant state planning policies
  - local government planning schemes
  - possible effect on town planning objectives and controls, including local government zoning and strategic plans
  - constraints to potential developments and possibilities of rezoning adjacent to the development area
  - management of the immediate environs of the project including construction buffer zones
  - proposed land use changes in any areas of high conservation value and information on how easement widths and vegetation clearance in sensitive environmental areas will be minimised

- potential issues involved in proximity and/or co-location of other current or proposed infrastructure services
- any land units requiring specific management measures.

Where there are to be disruptions to the stock route network by any components of the project describe realignment/replacement of corridors of similar width and suitable country type of the same quality to allow for the uninterrupted flow of travelling stock to ensure the connectivity and usability of the network.

## 5.2.2. Scenic amenity and lighting

### Description of environmental values

Detail the scenic and landscape values of the area, focusing on the visual absorption capacity of the site, including any relevant World Heritage and National Heritage values of the area.

At a level of detail appropriate to the scale of the project, describe the relevant geomorphology, supported by illustrative mapping highlighting any significant features associated with environmental values.

### Potential impacts and mitigation measures

Describe the potential beneficial and adverse impacts of the project on landscape character and visual qualities of the site and the surrounding area. Address the local and broader visual impacts of the project buildings and other structures during all stages of the project as it relates to the surrounding landscape. This should include views from:

- places of residence, work and recreation
- road, cycle and walkways
- the air
- other known vantage points day and night.

Use sketches, diagrams, computer imaging/simulation and photos where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations.

Detail the measures to be undertaken to mitigate or avoid identified adverse impacts.

### Lighting

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

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

### 5.2.3. Topography, geology and soils

#### Description of environmental values

##### *Topography*

Provide maps locating the project in state, regional and local contexts. The topography should be detailed with contours at suitable increments, shown with respect to Australian Height Datum. Include significant features of the landscape and topography, and accompanying comments on the maps.

##### *Geology*

Provide a description, map and a series of cross-sections of the geology of the project area relevant to the project components. Describe the geological properties that may influence ground stability, occupational health and safety, or the quality of stormwater leaving any area disturbed by the project.

Include information on the presence any minerals, including sulphide in rocks affected with the potential to create acidic, metalliferous or saline drainage. If present, discuss the practicality of avoidance or mitigation. Describe abatement, management and monitoring measures to avoid adverse impacts to surface and groundwater quality. Assessment should be consistent with environmental best practice such as the GARD Guide developed by The International Network for Acid Prevention (see <http://www.gardguide.com/index.php/Main Page>).

##### *Mineral resources*

Summarise the results of studies and surveys undertaken to identify and delineate the mineral resources within the project area (including any areas underlying related infrastructure).

Describe in detail, as indicated in the dot points below, the location, tonnage and quality of the mineral resources within the project area. Where possible, present this information on a 'seam-by-seam' basis and include the modifying factors and assumptions made in arriving at the estimates. The mineral resources should be estimated and reported, as appropriate, in accordance with:

- the *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves* (the JORC Code) (Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists & Minerals Council of Australia 2012)
- the principles outlined in the *Australian Guidelines for the Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves* (Coalfields Geology Council of New South Wales & Queensland Mining Council 2003).

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

- location and aerial extent of the mineral resources to be developed or mined
- location and boundaries of mining tenures, granted or proposed, to which the project area is, or will be subject

- location of the proposed mine excavation(s)
- location and boundaries of any project sites
- location and boundaries of any other features that will result from the proposed mining including waste/spoil dumps, water storage facilities and other infrastructure
- location of any proposed buffers, surrounding the working areas
- 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.

### Soils

The soil and land suitability field survey should be undertaken at a scale of 1:50,000 for the entire EIS study area and 1:25,000 for disturbance areas, in accordance with the *Guidelines for Surveying Soil and Land Resources* (McKenzie et al. 2008).

Soil profiles should be described according to the *Australian soil and land survey field handbook* (National Committee on Soil and Terrain 2009), grouped according to their parent material and position in the landscape, and classified according to the *Australian soil classification* (Isbell 2002). Where possible, soils should be correlated to those described in soil survey maps and reports for the similar landscape in the region.

Particular reference to the physical and chemical properties of the materials that will influence erosion potential, stormwater run-off quality, rehabilitation and agricultural productivity of the land should be included. Representative soils must be sampled down the profile for laboratory analysis as outlined in *Land Suitability Assessment Techniques* in the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (Department of Minerals and Energy 1995).

An assessment of the depth and quality of useable topsoil and subsoil to be stripped and stockpiled for rehabilitation should be undertaken and documented.

### Study objectives for assessing land suitability

Undertake a soil and land suitability assessment, as follows:

- Classify and determine the soil types within the EIS study area.
- The soil taxonomic classification system should be used in accordance with the Australian Soil Classification (ASC) system. This system is routinely used as the soil classification system in Australia. The scale of mapping used for this project should be 1:25,000 for disturbance areas and 1:50,000 across the overall site.
- Assess the pre-mining and post-mining Land Suitability (LS) classes within the EIS study area.
- The *Guidelines for Agricultural Land Evaluation in Queensland* (DPI 1990) should be used. This includes a standard list of limitations for assessing agricultural land suitability in Queensland.
- Assess the pre-mining and post-mining Agricultural Land Classes (ALC) within the EIS study area.
- Assess the pre-mining and post-mining good quality agricultural land (GQAL) within the EIS study area.



- The *Planning Guidelines: The Identification of Good Quality Agricultural Land* (Department of Primary Industries & Department of Housing, Local Government and Planning 1993) should be used or any relevant state planning policies. This guideline defines four classes of agricultural land and sets conditions for land in terms of limitations, rating the ability of the land to maintain a sustainable level of agricultural productivity.
- Assess the pre-mining and post-mining SCL within the EIS study area and provide soil management recommendations for the topsoil management.
- The relevant guideline applied should be *Protecting Queensland's strategic cropping land: Guidelines for applying the proposed strategic cropping land criteria* (Department of Environment and Resource Management 2011e). It provides guidance on assessing SCL in terms of preliminary assessment, field mapping, criteria and next steps for validation.
- Assess the suitability of the current topsoil for future rehabilitation including the identification of unfavourable materials in the EIS study area.
- The *Guide for Selection of Topdressing Material for Rehabilitation of Disturbed Areas* (Elliot & Veness 1981) should be used to determine the soils that are suitable for conserving and utilising in the EIS study area's rehabilitation program. The approach described in this guideline remains the benchmark for land resource assessment in the Australian mining industry.
- Assess the potential erosion rates for various scenarios during the construction, operational and post-mining phases of the project.
- The Revised Universal Soil Loss Equation should be used to calculate erosion rates and potential erosion hazards, as sourced from Landcom (2004) *Managing Urban Storm Water - Appendix 1A, NSW Government*.

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

Provide details of any potential impacts to the topography or geomorphology associated with the project and proposed mitigation measures, including:

- a discussion of the project in the context of major topographic features and any measures taken to avoid or minimise impact to such, if required
- the objectives to be used for the project in any re-contouring or consolidation, rehabilitation, landscaping, and fencing.

Identify the possible soil erosion rate for all permanent and temporary landforms and describe the techniques used to manage the impact. Identify all soil types and outline the erosion potential (both wind and water). Include an assessment of likely erosion effects, especially those resulting from removing vegetation, and constructing retaining walls both on-site and off site for all disturbed areas.

Identify erosion management techniques to be used. Provide details of an erosion monitoring program (including rehabilitation measures for erosion problems identified during construction), and detail acceptable mitigation strategies. Summarise methods proposed to prevent or control erosion with regard to:

- preventing soil loss in order to maintain land capability/suitability

- preventing degradation of local waterways.

Identify any areas within the project footprint where the project is likely to temporarily or permanently impact SCL and potential SCL. Where areas of identified SCL and potential SCL are likely to be impacted upon by the project, address the requirements of the *Strategic Cropping Land Act 2011* (SCL Act) as they apply to the components of the project, in consultation with the Department of Natural Resources and Mines to discuss undertaking the SCL assessment process defined by the SCL Act.

### **Resource utilisation**

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

### **Subsidence**

Provide comprehensive surface subsidence predictions, taking into account factors such as topographic variations and geological complexities, with a full description of the methodology and an assessment of the reliability of the predictions. Show the results of the predictions on maps with 1m contour increments and at a scale appropriate for assessing surface subsidence impacts. Propose mitigation measures to deal with any significant impacts that would result from subsidence.

Provide a description of proposed subsidence management techniques for remediation and monitoring of subsidence cracking and ponding (to be detailed in a subsidence management plan prior to construction). Include in an indicative plan of the timeline for predicted subsidence, location, potential subsidence impacts in particular any impacts to any noted environmental values which may be impacted and any mitigation measures including triggers for managing surface cracking, and rehabilitation methods to a nominated post-mining land use.

This section should include, but is not limited to:

- a description of the long-wall mining and the physical process of subsidence
- a description of subsidence impacts to downstream surface water flow values and management techniques for remediation and monitoring
- a description of the known or likely subsidence effects on surface and groundwater hydrology
- a description of subsidence effects on terrestrial ecosystems (including which vegetation communities and flora species are most likely to be affected by changes to surface hydrology)
- a summary of the impact of subsidence effects on freshwater ecosystems from existing long-wall mining in Central Queensland, and other parts of Australia with similar underlying geology that have been undermined

- geological features, such as faults, that may affect the level of subsidence or subsidence effects, must be described and mapped
- a description and analysis of the likely level of subsidence from the proposed action, including maps showing expected subsidence level contours
- a description of potential impacts to aquatic and terrestrial ecosystems from subsidence effects as a result of the proposed mine
- assess the potential impacts of subsidence on the sediment load within watercourses.

The plan must include maps that show the expected subsidence level contours and a clear description of the types and amounts of habitats associated with areas of high likely impacts, medium level and low level impacts.

### **Land disturbance**

Develop a strategy that will minimise the amount of land disturbed at any one time. Describe the strategic approach to progressive rehabilitation of landforms and final decommissioning. Describe the methods to be used for the proposal, including backfilling, covering, re-contouring, topsoil handling and revegetation.

Refer to the description of the location of final voids and uncompacted overburden and workings at the end of mining in relation to flood levels from nearby watercourses up to and including a range of flood levels, for the locality. (See Section 4.11, 'Rehabilitation and decommissioning'.)

Demonstrate that proposed protection from flooding is sustainable for the foreseeable future. Management and maintenance arrangements should be supported by appropriate erosion and stability monitoring to substantiate long-term rehabilitation sustainability.

Where waterways are proposed to be diverted, describe the impact on land use due to hydrology changes, both upstream and downstream. Also, detail the final drainage and seepage control systems and any long-term monitoring plans.

Where dams, roads, levee banks, waterway diversions and other infrastructure are to remain upon project decommissioning, provide proposals to manage and maintain these structures. Management and maintenance arrangements should be supported by appropriate erosion and stability monitoring to substantiate long-term rehabilitation sustainability.

Assess the mitigation measures for land disturbance to be used on decommissioning the site, providing sufficient detail to decide their feasibility. In particular, address the long-term stability of final voids and spoil dumps, safety of access to the site after surrender of the lease, and the residual risks that will be transferred to the subsequent landholder.

Describe the strategy that will be used to manage topsoil, considering transport, storage and replacement of topsoil to disturbed areas. Also outline how soil from good quality agricultural land will be best used. Address the minimisation of topsoil storage times (to reduce fertility degradation). Describe erosion and sediment control measures, particularly in relation to managing sodic and saline overburden material.

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.

## 5.2.4. Land contamination

### Description of environmental values

Include:

- a review of historical data, including a review of aerial photographs, historical certificates of title search, and interviews
- mapping of any areas listed on the EMR or CLR under the EP Act
- a review of relevant geological, hydrogeological and topographical maps and databases to examine the physical setting of the EIS study area
- a site inspection to update existing information collected during previous site inspections, as well as to examine the current environmental setting of the EIS study area, observe current activities and identify surrounding land uses
- the preparation of a preliminary site investigation report detailing the investigations undertaken.

### Potential impacts and mitigation measures

Discuss the management of any contaminated land and potential for contamination from construction, commissioning, operation and decommissioning, in accordance with the *Guidelines for Contaminated Land Professionals* (Department of Environment and Heritage Protection 2012b) and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Cwth).

Describe strategies and methods to be used to prevent and manage any land contamination resulting from the project, including the management of any acid generation or management of chemicals and fuels to prevent spills or leaks.

State any intentions concerning the classification of land contamination after project completion.

## 5.3. Surface water

### 5.3.1. Description of environmental values and baseline conditions

Describe and illustrate the existing surface drainage patterns, overland flows, and palustrine and lacustrine wetlands. The description must include suitably scaled maps of catchments, watercourses, drainage pathways, wetlands, or sources of water supply (such as farm dams) potentially affected by the project, whether on or off the project site.

Describe, with supporting photographs, the geomorphic condition of any watercourses likely to be affected by disturbance or stream diversion. The results of this description

would form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the project.

Describe the hydrology of watercourses and overland flow in the project area and any downstream locations potentially affected by the project.

Provide details of the likelihood of flooding (using information on the history of flooding) including extent, levels and frequency of floods in and around the project site. Flood studies must include a range of annual exceedence probabilities or potentially affected waterways, based on observed data if available or use appropriate modelling techniques and conservative assumptions if there are no suitable observations. The flood modelling assessment must include local flooding due to short duration events from contributing catchments on-site, as well as larger scale regional flooding including waterways downstream.

Describe the environmental values of the surface waterways and groundwater of the affected area in terms of environmental values under the Environmental Protection Act 1994 (section 9) and Environmental Protection (Water) Policy 2009. This should include all present and potential users and uses of water in areas potentially affected by the project, including municipal, agricultural, industrial and recreational uses of water. Describe the quality of surface waters in the area potentially affected by the project with an outline of the significance of these waters to the river catchment system in which they occur. The description should be based on a monitoring program, with sampling stations located upstream at background reference sites (sites that are currently not impacted and are likely not to be impacted by this or similar activities) and downstream of the project.

Identify and reference existing data obtained from other monitoring programs. Monitoring should include sites upstream of any proposed release points and at downstream locations that would be below any mixing zone. Sites should include permanent and semi-permanent water holes, known aquatic habitat, weirs or reservoirs. Available complementary stream-flow data should be obtained from historical records from the current stream gauging station network to assist interpretation. Where data exist, describe the flow regime for the receiving environment using plots of flow (cumecs) versus flow duration (per cent) to identify the flow duration of event high-flow, base-flow and no-flow periods to characterise the receiving environment.

Describe seasonal variations in water quality and variations with flow. Estimate the event flow trigger for environmentally significant analytes in each receiving waterway based on this observed variation (plot flow against environmentally significant analytes).

Measure a range of physical, chemical and biological parameters relevant to the potential environmental harm on any affected creek or wetland system. This would include, but not necessarily be limited to, water quality indicators likely to be affected by the project such as electrical conductivity, total and dissolved metals, turbidity, suspended sediments and pH. Biological indicators should include macro-invertebrate surveys undertaken at appropriate locations according to best practice methods. All sampling should be performed in accordance with the *Monitoring and Sampling Manual*

2009 Version 2 (Department of Environment and Resource Management 2010b) or the most current edition.

All water quality data should be presented in a suitable format for assessment against relevant water quality objectives or guideline trigger values as described in Schedule 1 of the EPP (Water), the *Queensland Water Quality Guidelines* (Department of Environment and Resource Management 2009a) and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMICANZ 2000). Physico-chemical stressors and toxicants should at least be presented to allow for comparison with guideline values, together with data ranges and the limit of reporting. Provide relevant metadata that would facilitate an assessment of the quality of this data set, including number of samples, timing and frequency of sampling and any quality assurance and quality control undertaken (for example, replicates, blanks and calibration).

### 5.3.2. Potential impacts and mitigation measures

Describe the existing water management network at GRB and how integration of the project will be achieved.

Clearly and consistently distinguish between this monitoring program for the baseline condition assessment from any monitoring programs required for future compliance assessment or as a component of the receiving environment monitoring program (described in Section 5.4). Provide detailed mapping to illustrate the locations of each sampling site within these monitoring programs with respect to release points and gauging stations.

Map the areas of proposed long-wall mining in relation to streams and environmental assets and quantify total area of expected subsidence.

Assess and quantify impacts of subsidence and stratigraphic cracking from long-wall mining on groundwater recharge, run-off and streamflow, and potential problems induced by physicochemical changes such as groundwater and streamflow contamination, generation of acid drainage and the potential for induced salinity.

Map the proposed areas of post-mining voids/lakes and define approximate lake dimensions.

Identify and map post-mine rehabilitated areas and assess the ongoing impact these will have on the regional surface water hydrology and:

- quantify the impacts of mining on the local and regional hydrology
- assess the potential cumulative impacts of this project with the known developments in the Bowen Basin region, including potential impacts on:
  - surface water quality
  - surface water hydrology.

Discuss the need or otherwise for licensing of any proposed dams under the Water Act and referable dams under the *Water Supply (Safety and Reliability) Act 2008* (WSSR Act). Detail the proposed capacities of water storages and indicate whether they would

capture clean water (including overland flow) or would hold mine affected water to comply with an environmental authority.

Describe any approvals and water allocations the project may need under the Water Act for water supply, stream diversions and storage. Requirements relating to the Referable Dam provisions of the WSSR Act, and those associated with attaining approval under the Sustainable Planning Regulation 2009 need to be considered.

Describe in detail the proposed water management controls for the proposed mine water balance, addressing surface and ground water quality and quantity, drainage patterns (including the separation of natural and mine affected run-off) and sediment movements and quantity. Detail the water management infrastructure including, but not necessarily limited to, water storages, mine affected water dams, sedimentation dams, water treatment plants, levees, drains, diversions, containment channels, bunding, monitoring points, spillways, release points and any interconnections between these and the receiving environment using flow diagrams.

Describe the proposed quality, quantities and locations of waste water discharges. Include tables with the latitude and longitude (GDA94) for all release points, sampling sites and gauging stations relevant to monitoring programs. Use stream flow data, receiving environment monitoring data (background water quality condition assessment), and proposed release limits and rates to estimate in-stream dilution and water quality at different points downstream of the proposed release.

If downstream sensitive receptors, such as drinking water storages or aquatic ecosystems of high ecological value are likely to be affected, these should be identified and the assessment should extend at least to that point downstream. Consider periods of low-flow, medium-flow and high-flow in this assessment. Compare the predicted contaminant levels to the water quality objectives and provide an assessment of the assimilative capacity of the receiving waters.

Assess the acute and chronic potential impacts of the release of mine affected waters (or other discharges) including the cumulative impacts to water quality and environmental values of the receiving environment due to discharges from other projects or industry.

Describe monitoring programs that would assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the project.

Describe any proposed no-release water systems, assess the management and fate of contaminants in the systems, the risk of environmental harm due to a temporal decline in water quality, and propose mitigation measures for any potential impacts.

Describe and illustrate with maps, plans and cross-sections any proposal to divert creeks or undertake other in-stream works. Assess the potential impacts of in-stream works on hydrology and water quality, and propose measures for avoiding or mitigating the impacts and stabilising and rehabilitating any works.

Assess the hydrological impacts of the project on surface water and water courses including for consistency with the outcomes and objectives of the *Water Resources (Fitzroy Basin) Plan 2011*. The assessment will have particular regard to stream

diversions, scouring and erosion, and changes to flooding levels and frequency of flooding, both upstream and downstream of the project. If flooding levels will be affected, modelling of afflux should be provided and illustrated with maps.

Water allocation and water sources, including impacts on existing water entitlements, including water harvesting, should be established in consultation with the relevant department. Where a licence or permit would be required under the Water Act to take water or interfere with the flow of water, provide information and an assessment for the administering authority to consider the suitability of approving any necessary works under the Water Act. Similarly, provide information and an assessment to consider any approval for waterway barrier works under the Fisheries Act.

Describe and illustrate: the locations, catchments, footprints, cross-sections and method of construction of any dams on the site, their flood immunity, the quality of water or waste water they would contain, and indicate their hazard category. Provide the design storage allowances for mine affected water dams, tailings dams, sediment dams and process or waste water dams, and demonstrate that the design has been produced by a suitably qualified and experienced engineer using current best practice. Propose measures to manage sediment dams, tailings dams and process or waste water dams and their discharge, and to decommission and rehabilitate the dams when their use ends.

## **5.4. Groundwater**

### **5.4.1. Description of environmental values**

If the project is likely to use or affect local sources of groundwater, describe groundwater resources in the area in terms of:

- geology and stratigraphy
- aquifer type—such as confined, unconfined
- depth to and thickness of the aquifers
- depth to water level and seasonal changes in levels
- groundwater flow directions (defined from water level contours)
- groundwater quality
- interaction with surface water
- interaction with saline water
- possible sources of recharge
- potential exposure to pollution
- current access to groundwater resources in the form of bores, springs and ponds (including quantitative yield of water and locations of access)
- current estimated level of take from each aquifer and analysis of the current aquifer
- water level conditions (that is, under stress, or not under stress).

Review the quality, quantity and significance of groundwater in the project area, together with groundwater use in neighbouring areas. Refer to relevant legislation or water resource plans for the region. The review should also provide an assessment of



the potential take of water from the aquifer and how current users and the aquifer itself and any connected aquifers will be affected by the take of water.

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
- drawdown and recharge at normal pumping rates
- seasonal variations (if records exist) of groundwater levels.

Develop a network of observation points that would satisfactorily monitor groundwater resources both before and after commencement of operations. Describe the role and purpose of the monitoring program and provide justification for existing and proposed monitoring points.

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.

#### **5.4.2. Potential impacts and mitigation measures**

Assess the project's potential impacts on water resource environmental values identified in the previous section.

Assess how the proposed project will change both the site and regional water balances. The water balance analysis could include (but not necessarily be limited to) the following information:

- usage of the groundwater and identified aquifer(s)
- an assessment of regional groundwater assets
- critical dependencies of the identified aquifer(s) and extent of hydrological interconnectivity
- an understanding of the structural and dynamic ground and surface water systems (including recharge and discharge)
- an assessment of the quality of information and data for the identified systems.

Detail project elements which will induce changes to the pre-mining surface water/groundwater hydrology, for example, areas of long-wall mining and subsidence, rehabilitated areas, remaining spoil heaps, operational and post-mining voids/lakes.

Quantify the post mine impacts of underground mining with associated subsidence and stratigraphic cracking on catchment run-off and quantify the sediment loss from rehabilitated areas including spoil heaps on stream hydrology and biota.

Quantify evaporative losses (and define the methodology for doing so) from voids/lakes, and the impact that this will have on the local and regional hydrology.

Identify the aquifer(s) depleted by evaporative losses, expected salinity build-up in the lakes and the potential migration of the resultant saline plume into the regional groundwater flow regime.

For all phases of the project (including construction, operation and remediation phases):

- assess the project's potential impacts on water resource environmental values identified in the previous section
- define and describe the objectives and practical measures for protecting or enhancing water resource environmental values
- describe how nominated quantitative standards and indicators may be achieved, and how the achievement of objectives will be monitored, audited and managed
- assess the potential cumulative impacts of this project with the known developments in the Bowen Basin region, including potential impacts on:
  - groundwater quality
  - groundwater hydrology.

Assess the potential impacts of mine affected groundwater inputs to local and downstream water quality and environmental values due to any controlled and uncontrolled release of mine affected water from the site and the GRB mine complex water management system.

Describe monitoring programs that would assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the project.

Conduct a risk assessment, based on conservative water quality estimates and hydrology, for uncontrolled emissions to groundwater due to system or catastrophic failure, assess the potential impacts of such emissions on human health and natural ecosystems, and provide detailed measures to avoid or minimise impacts.

Assess the potential impacts on local groundwater resources and quality, and define the extent of the area where groundwater resources are likely to be affected by the proposed operations. Assess the potential impacts of the operations on groundwater draw-down, depletion or recharge, and propose management options to monitor and mitigate these effects.

Assess the impact of the project on the local groundwater regime caused by the altered porosity and permeability of any land disturbance (for example, subsidence).

Assess and describe any potential for the project to impact on groundwater-dependent ecosystems, including their flora and fauna. Describe avoidance and mitigation measures.

Propose measures to avoid, mitigate and remediate any impacts on groundwater resources or quality.

Queensland is a signatory to the Council of Australian Governments (COAG) National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development (NPA). The NPA requires CSG or large coal mining development proposals undergoing environmental impact assessment that are likely to have a significant impact on water resources to be referred to an Independent Expert Scientific Committee (IESC).

Accordingly, the Coordinator-General is likely to refer this project to the IESC. Therefore, in addition to the information described in the surface and groundwater

sections, the proponent must provide a stand-alone document to the Coordinator-General that includes details of the project's potential impact on surface and groundwater resources. The document must be provided when the EIS is lodged.

The document must be prepared in accordance with the *Independent Scientific Committee Information Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources*—available from [www.environment.gov.au/coal-seam-gas-mining/project-advice/pubs/iesc-information-guidelines.pdf](http://www.environment.gov.au/coal-seam-gas-mining/project-advice/pubs/iesc-information-guidelines.pdf)

All fields in the 'request for advice checklist' must be completed. Before the proponent finalises the EIS documents, the Office of the Coordinator-General will provide the proponent with the current template document being used by the Office of Water Science in SEWPaC for the 'request for advice' to the IESC.

## 5.5. Nature conservation

Detail the existing nature conservation values that may be affected by the proposal. Describe the environmental values in terms of:

- integrity of ecological processes, including habitat of endangered, vulnerable and near-threatened (EVNT) and special least-concern species
- conservation of resources
- biological diversity, including habitat of EVNT and special least-concern species
- integrity of landscapes and places including wilderness and similar natural places
- aquatic and terrestrial ecosystems.

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

Wherever possible, seek the involvement of the local Indigenous community in conducting field observations and survey activities, to identify the traditional and contemporary Indigenous uses of species.

Also outline the proposed strategies to avoid, or minimise and mitigate, impacts on the identified values within the project's footprint.

Identify key flora and fauna indicators for ongoing monitoring.

### 5.5.1. Sensitive environmental areas

#### Description of environmental values

On a map of suitable scale, identify areas that are environmentally sensitive within the study area in proximity to the project. This should include areas classified as having national, state, regional or local biodiversity significance, or flagged as important for their integrated biodiversity values. Refer to Queensland legislation and policies on threatened species and ecological communities.

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

- important habitat of species listed under the *Nature Conservation Act 1992* (NC Act)
- regional ecosystems (REs) listed as 'endangered' or 'of concern' under state legislation
- good representative examples of remnant REs or REs that are described as having 'medium' or 'low' representation in the protected area estate as defined in the Regional Ecosystem Description Database (REDD) available at [www.ehp.qld.gov.au](http://www.ehp.qld.gov.au)
- sites containing near-threatened or bio-regionally significant species or essential, viable habitat for near-threatened or bio-regionally significant species
- areas or features identified as State significant biodiversity values, pursuant to the Queensland Biodiversity Offset Policy (version 1) (Department of Environment and Resource Management 2011c)
- sites containing common species that represent a distributional limit and are of scientific value or that contain feeding, breeding, resting areas for populations of echidna, koala, platypus and other species of special cultural significance
- sites of high biodiversity that are of a suitable size or with connectivity to corridors and protected areas to ensure survival in the longer term; such land may contain:
  - natural vegetation in good condition or other habitat in good condition (for example, wetlands)
  - degraded vegetation or other habitat that still support high levels of biodiversity or act 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 that 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
- declared fish habitat areas and sites containing protected under the Fisheries Act
- sites of palaeontologic significance such as fossil sites
- sites of geomorphological significance
- protected areas that have been proclaimed under the NC Act
- declared areas of major interest or critical habitat declared under the NC Act
- declared areas of high nature conservation value or areas vulnerable to land degradation under the *Vegetation Management Act 1999* (VM Act)
- remnant vegetation listed under the VM Act as containing endangered and of-concern regional ecosystems where clearing is likely to result in land degradation and a loss of ecosystem function and biodiversity.

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.

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

Discuss the impact of the project on species, communities and habitat of local, regional or state significance in sensitive environmental areas as identified above. Include human impacts and the control of any domestic animals introduced to the area.

Demonstrate how the project would comply with the following hierarchy:

- avoiding impact on areas of remnant vegetation and other areas of conservation value including the habitat of listed species
- mitigating impacts through rehabilitation and restoration including, where relevant, a discussion of any relevant previous experience or trials of the proposed rehabilitation
- replacing or offsetting the loss of conservation values, where impacts cannot be avoided or mitigated.

Explain why the measures above may not apply in areas where loss would occur.

Discuss the boundaries of the areas impacted by the project within or adjacent to an ecological community, including details of footprint width. If the project area will impact upon an endangered ecological community, include reasons for the preferred alignment and the viability of alternatives.

Describe strategies for protecting Ramsar wetlands and discuss any obligations imposed by state or Commonwealth legislation or policies, or international treaty obligations (that is, China–Australia Migratory Bird Agreement, Japan–Australia Migratory Bird Agreement, Republic of Korea–Australia Migratory Bird Agreement).

Provide details about any approvals that will be required under the NC Act and the VM Act for development made assessable under SPA. The project should address the performance requirements of the relevant policies and regional vegetation management codes (refer to

**[www.derm.qld.gov.au/vegetation/regional\\_codes.html](http://www.derm.qld.gov.au/vegetation/regional_codes.html)**).

Where relevant, this section should discuss environmental offset requirements in accordance with the Queensland Government Environmental Offsets Policy (Environmental Protection Agency 2008b) and take into account the applicable specific-issue offset policies, as follows:

- State Policy for Vegetation Management (Department of Environment and Resource Management 2009b)
- Policy for Vegetation Management Offsets (Department of Environment and Resource Management 2011b)
- Queensland Biodiversity Offset Policy (Department of Environment and Resource Management 2011c)
- Offsets for Net Gain of Koala Habitat in South East Queensland Policy (Department of Environment and Resource Management 2010)

Describe any departure from 'no net loss' of ecological values.

## 5.6. Terrestrial ecology

### 5.6.1. Terrestrial flora

#### Description of environmental values

Provide vegetation mapping for all relevant project sites. Discuss any variances between site mapping and mapping produced by the Queensland Herbarium.

Describe the terrestrial vegetation communities within the affected areas 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 RE type descriptions in accordance with the REDD
- location of vegetation types and ecological communities of state and national conservation significance based on RE types and occurrence of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994 (Qld) and subsequent amendments, as well as areas subject to the VM Act
- 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 and conservation reserves under the NC Act)
- any plant communities of cultural, commercial or recreational significance
- location and presence of any state or nationally protected flora species and /or potential habitat for these species within the project area
- the location of any horticultural crops in the vicinity of the project area
- location and abundance of any known exotic or weed species including a description of the prevalence of introduced/exotic pasture grasses within the project site.

Highlight sensitive or important vegetation types, including any riparian vegetation, and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types. 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.

For each significant natural vegetation community likely to be impacted by the project, vegetation surveys should be undertaken at an appropriate number of sites, at least once in the wet season and once in the dry season, and satisfying the following:

- the relevant regional vegetation management codes
- site data should be recorded in a form compatible with the Queensland Herbarium CORVEG database and HERBRECS
- the minimum site size should be 10 × 50 metres
- a complete list of species present at each site should be recorded
- the surveys to include species structure, assemblage, diversity and abundance
- the relative abundance of plant species present to be recorded

- any plant species of conservation, cultural, commercial or recreational significance to be identified
- specimens of species listed as protected plants under the Nature Conservation (Wildlife) Regulation, other than common species, are to be submitted to the Queensland Herbarium for identification.

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

Describe the potential environmental impacts to the ecological values of the area arising from the construction, operation and decommissioning of the project including clearing, salvaging or removing vegetation. Discuss the indirect effects on remaining vegetation. Consider short- and long-term effects and comment on whether the impacts are reversible or irreversible.

For all components of the project, discuss:

- the potential impacts that clearing vegetation will have on listed species and ecological communities in the extent of the proposed vegetation clearing
- any management actions to minimise vegetation disturbance and clearance
- the ability of identified vegetation to withstand any increased pressure resulting from the project, and any measures proposed to mitigate potential impacts
- the methods to ensure rapid and environmentally appropriate rehabilitation of disturbed areas following construction, including the species chosen for revegetation, which should be consistent with the surrounding associations
- any post-construction monitoring programs
- the potential environmental harm on flora due to any alterations to the local surface and groundwater environment, with specific reference to impacts on riparian vegetation or other sensitive vegetation communities.

Outline how these mitigation measures and monitoring will be implemented for the project.

Discuss weed management strategies for containing existing weed species (for example, parthenium and other declared plants) and ensuring no new declared plants are introduced to the area through project activities.

## **5.6.2. Terrestrial fauna**

### **Description of environmental values**

Describe the terrestrial and riparian fauna occurring in the areas affected by the proposal, 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 study area should include:

- species diversity (that is, a species list) and abundance of animals of recognised significance
- 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 introduced animals including those of economic or conservation significance
- existence (actual or likely) of any species and communities of conservation significance in the study area, including discussion of range, habitat, breeding, recruitment feeding and movement requirements, and current level of protection (for example, any requirements of protected area management plans or threatened species recovery plans)
- habitat requirements and sensitivity to changes, including movement corridors and barriers to movement
- an estimate of commonness or rarity for the listed or otherwise significant species use of the area by migratory fauna
- records in a form compatible with the Wildlife Online database.

For each significant natural vegetation community, ecosystem, or habitat likely to be impacted by the project, fauna surveys should be undertaken at an appropriate number of sites consistent with habitat variation and size, and with existing knowledge of species potentially occurring in the project area and the survey effort required to confirm presence or absence of such species. Fauna surveys should be conducted during periods of the year consistent with seasonal variation in fauna presence or level of activity including the wet season and dry season.

Indicate how well any affected communities are represented and protected elsewhere in the bio-region where the project occurs. Specify the methodology used for fauna surveys and compliance with Queensland and Commonwealth survey guidelines. If methods do not comply, provide justification of how surveys are suitable and representative. Provide relevant site data to the Department of Environment and Heritage Protection (DEHP) in a format compatible with the Wildlife Online database for listed threatened species (refer to: [www.ehp.qld.gov.au/wildlife/wildlife-online/index.html](http://www.ehp.qld.gov.au/wildlife/wildlife-online/index.html)).

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

Consider potential impacts on terrestrial fauna, relevant wildlife habitat and other fauna conservation values, including:

- impacts due to loss of range/habitat, food supply, nest sites, breeding/recruiting potential or movement corridors or as a result of hydrological change
- impacts on native species, particularly species of conservation significance
- cumulative effects of direct and indirect impacts
- threatening processes leading to progressive loss
- a description of any foreseen impacts that increase the susceptibility of ecological communities and species to the impacts of climate change
- indirect impacts through the decrease in vegetation quality in surrounding areas as a result of the project activities.

Address any actions of the project or likely impacts that require an authority under the NC Act. Provide the following information on mitigation strategies:



- measures to avoid and mitigate the identified impacts. Any provision for buffer zones and movement corridors, nature reserves or special provisions for migratory animals should be discussed and coordinated with the outputs of the flora assessment
- details of the methodologies that would be used to avoid injuring livestock and native fauna as a result of the project's construction and operational works, and if accidental injuries should occur, the methodologies to assess and handle injuries
- strategies for complying with the objectives and management practices of relevant recovery plans
- measures to rehabilitate disturbed areas, which incorporate provision of nest hollows and ground litter, where appropriate.

Outline how these measures will be implemented for the project.

Discuss feral animal management strategies and practices. Develop strategies to ensure that the project does not contribute to the introduction of exotic/feral animal species or increased density and distribution of a feral animal species.

## 5.7. Aquatic ecology

### 5.7.1. Evaluation of aquatic ecological values

Describe the aquatic flora and fauna present, or likely to be present, in the areas affected by the project. Include:

- fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area and any associated wetlands (as defined under section 5 of the Fisheries Act)
- any rare or threatened aquatic species
- exotic and pest organisms
- a description of the habitat requirements and the sensitivity of aquatic species to changes in flow regime, water levels and water quality in the project areas
- aquatic plants, including native, exotic and weed species
- aquatic matrices including benthic substrate
- habitat downstream potentially impacted by the project due to currents in associated lacustrine and marine environments.

Describe the wetlands identified by the *Queensland Wetland Mapping* (version 3) (Department of Environment and Heritage Protection 2012a), with particular attention given to palustrine wetlands (Wetland ID 38060) and any other wetland identified as being of high ecological significance.

Conduct a desktop assessment of the potential for stygofauna to occur within the zone of influence of the project in accordance with the *Guidance for the Assessment of Environmental Factors No. 54a* (Western Australia Environmental Protection Agency 2007), or any more recent publication that supersedes that guideline. If the desktop assessment identifies potentially significant stygofauna values, provide a description to order or family taxonomic rank of the presence and nature of any stygofauna occurring in groundwater likely to be affected by the project.

## Potential impacts and mitigation measures

Discuss the potential impacts of the project on the aquatic species and ecosystems and describe proposed mitigation actions, including:

- proposed location, type and design of waterway barrier works (temporary and permanent) that would impact on aquatic resources, particularly fish movement, with an appropriately scaled map
- proposed stream diversions, causeway construction and crossing facilities, stockpiled material and other impediments that would restrict free movement of aquatic fauna
- alternatives to waterway crossings where possible
- measures to avoid fish spawning periods, such as seasonal construction of waterway crossings and measures to facilitate fish movements through water crossings
- measures for exotic/pest aquatic species
- offsets proposed for unavoidable, permanent loss of fisheries habitat
- monitoring aquatic biology health, productivity and biodiversity in areas subject to direct discharge.

Address any actions of the project or likely impacts that require an authority under the relevant legislation, including the NC Act and/or the Fisheries Act. Outline how these methods, measures and monitoring will be implemented in the environmental management for the project.

## 5.8. Air quality

### 5.8.1. Introduction

Describe the existing air quality that may be affected by the project in the context of environmental values as defined by the EP Act and Environmental Protection (Air) Policy 2008 (EPP (Air)).

### 5.8.2. Pollutants considered in the assessment

Discuss the existing local and regional air shed environment, including:

- background levels and sources of particulates, gaseous and odorous compounds and any major constituent
- pollutants (including greenhouse gases)
- baseline monitoring results, sensitive receptors.

### 5.8.3. Description of environmental values

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 impacts.

Parameters should include air temperature, wind speed and direction, atmospheric stability, mixing depth and other parameters necessary for input to the models.

#### 5.8.4. Potential impacts

For air quality issues and their mitigation:

- include an inventory of air emissions from the project expected during construction and operational activities (including source, nature and levels of emissions)
- describe pollution control equipment and pollution control techniques employed on the premises and the features of the project designed to suppress or minimise air emissions, including dusts
- describe any back-up measures that will act in the event of primary measures failing to minimise the likelihood of upsets and adverse air impacts
- identify all expected emissions of hazardous air pollutants and their emissions from known and fugitive sources
- using relevant inputs of emissions and local meteorology as input to an air dispersion model, estimate the likely impacts on the surrounding environment. (The model inputs should be as detailed as possible, reflecting any variation of emissions with time and including at least a full year of representative hourly meteorological data)
- estimate maximum ground level concentration and monthly average dust deposition values at the nearest sensitive receptor(s)
- present the results of the dispersion modelling as concentration contour plots and concentrations at the discrete sensitive receptors
- predicted ground level concentration should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions should be identified and modelled where necessary
- describe the background ambient air concentration from the existing sources in the airshed and evaluate the cumulative impact on the receiving environment (address both acute and chronic impacts by considering the project in conjunction with existing and known future emission sources within the region)
- provide an averaging period for ground level concentrations of pollutants that are modelled, consistent with the relevant averaging periods for air quality indicators and goals in the EPP (Air) and the National Environment Protection (Ambient Air Quality) Measure 2003 (Cwlth). For example, the modelling of PM<sub>10</sub> must be conducted for, 24 hour averaging period
- identify the worst-case meteorological conditions based on the modelled ground level predictions and, using this information, develop dust mitigation measures for the mining activities and describe the dust management plan that will be employed to mitigate adverse air impacts under the worst meteorological conditions
- discuss the limitations and accuracy of the applied atmospheric dispersion models and the implications of this for the air quality modelling results
- where there is no single atmospheric dispersion model that can handle the different atmospheric dispersion characteristics exhibited in the proposal area (for example, strong convection, terrain features, temperature inversions and pollutant re-circulation), a combination of acceptable models should be applied

- identify ‘worst-case’ emissions that may occur during operation. If these emissions are significantly higher than those for normal operations, it will be necessary to separately evaluate the worst-case impact as a separate exercise to determine whether the planned buffer distance between the facility and neighbouring sensitive receptors will be adequate
- ground level predictions should be made at any residential, industrial, agricultural, commercial and community developments believed to be sensitive to the effects of predicted emissions
- discuss climatic patterns that could affect dust generation and movement
- discuss vehicle emissions and dust generation along major haulage routes both internal and external to the project site.

### 5.8.5. Mitigation measures and management strategies

Detail the best practice mitigation measures together with proactive and predictive operational and maintenance strategies that could be used to prevent and mitigate impacts.

Discuss potential air quality impacts from emissions, with reference to the National Environmental Protection (Ambient Air Quality) Measure 2003 (Cwth) and the EPP (Air). If a relevant emission is not addressed in these legislative instruments, discuss the emission with reference to its risk to human health, including appropriate health-based guidelines/standards.

Outline how these dust mitigation measures will be implemented for the project.

## 5.9. Greenhouse gases

### 5.9.1. Description of environmental situation

Provide an inventory of projected annual emissions for the life of the mine for each relevant greenhouse gas, with total emissions expressed in ‘CO<sub>2</sub> equivalent’ terms for the following categories:

- scope 1 emissions—means direct emissions of greenhouse gases from sources within the boundary of the facility and as a result of the facility’s activities (including emission from vegetation clearing)
- scope 2 emissions—means emissions of greenhouse gases from the production of electricity, heat or steam that the facility will consume, but that are physically produced by another facility.

Briefly describe method(s) by which estimates were made.

Use the *National Greenhouse Accounts (NGA) Factors* (Commonwealth of Australia 2012b) as a reference source for emission estimates, supplemented by other sources where practicable and appropriate. As a requirement of the NGA factors, estimates should include the loss of carbon sink capacity of vegetation due to clearing.

## 5.9.2. Potential impacts and mitigation measures

Discuss the potential for greenhouse gas abatement measures, including:

- the proposed measures (alternatives and preferred) to avoid and/or minimise direct greenhouse gas emissions
- how the preferred measures minimise emissions and achieve energy efficiency
- any opportunities to further offset greenhouse gas emissions through indirect means including sequestration and carbon trading.

## 5.10. Noise and vibration

### 5.10.1. Description of environmental values

Describe the existing noise and vibration environment that may be affected by the project in the context of the environmental values defined by the Environmental Protection (Noise) Policy 2008 (EPP (Noise)). Refer to the following documents:

- *Noise Measurement Manual* (Environment Protection Agency 2000)
- *Guideline: Planning for Noise Control* (Environmental Protection Agency 2004)
- *Australian Standard AS 2187.2-2006 Explosives – Storage and Use, Part 2 Use of Explosives* (Standards Australia 2006)

Identify sensitive noise receptors adjacent to all project components and estimate typical background noise and vibration levels based on surveys at representative sites.

Discuss the potential sensitivity of such receptors and nominate performance indicators and standards.

If the proposed activity could adversely impact on the noise environment, undertake baseline monitoring at a selection of sensitive receptors potentially affected by the project. Sensitive receptors are defined in the EPP (Noise). Illustrate the locations of sensitive receptors on a suitably-scaled map.

Describe the results of any baseline monitoring of noise and vibration in the proposed vicinity of the project, including long-term measured background noise levels that take into account seasonal variations.

Report the daily variation of background noise levels at nearby sensitive receptors, with particular regard to detailing variations at different periods of the night. Monitoring methods should adhere to accepted best practice methodologies, relevant DEHP guidelines and Australian Standards, and any relevant requirements of the EP Regulation 2008 and the EPP (Noise).

Describe any current activities near the project area that may cause a background level of ground vibration (for example major roads, quarrying activities).

Develop and describe suitable indicators for measuring noise, and objectives that would protect the environmental values from significant noise and vibration impacts.

### 5.10.2. Potential impacts

Describe the impacts of noise and vibration generated during the pre-construction, construction and operational phases of the project. Noise and vibration impact analysis should include:

- the levels of noise and vibration generated, including noise contours, assessed against current typical background levels, using an Environmental noise model such as SoundPLAN), B&K Predictor, Cadna or others
- impact of noise, including low frequency noise (noise with components below 200 Hz) and vibration at all potentially sensitive receivers (for example, residences, social and public infrastructure, such as health, recreational and educational facilities, roads) compared with the performance indicators and standards nominated above in Section 5.10.1
- impact on terrestrial and avian fauna.

Using a suitable acoustic model, predict the likely generation of noise for different times of day under a range of climatic conditions, including the expected worst case.

Describe the predictions using suitable indicators, and illustrate the predicted noise contours on suitably scaled maps showing the locations of noise sensitive receptors.

Assess the potential impacts of noise and vibration at all potentially sensitive receptors in comparison to the objectives and standards to be achieved.

The assessment of noise impacts should include matters raised in the document *The Health Effects of Environmental Noise – Other Than Hearing Loss* (enHealth Council, 2004 (or later editions)).

Assess the potential environmental impacts of noise and vibration on terrestrial animals and birds, including migratory species. Also assess the potential impacts of noise and vibration on any relevant MNES.

Assess potential noise impacts on any nearby protected areas addressing amenity as well as impacts on animals. Discuss the magnitude, duration and frequency of any vibration and assess the potential impacts on sensitive receptors. Reference *Guideline: Noise and Vibration from Blasting* (Environmental Protection Agency 2006).

Assess potential off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the project. Define and describe practical measures for protecting or enhancing environmental values from impacts by noise and vibration, including details and illustrations of any screening, lining, enclosing or bunding. Provide a discussion of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise and vibration.

#### Night-time surface works

Provide details of any night-time surface work that may be undertaken. Specifically include:

- the reasons why night-time work may be undertaken (for example, to avoid peak traffic periods, or to undertake work in a rail corridor)
- the likely duration of work (if known)

- the proposed hours of the work
- the nature of the work to be undertaken
- the likely impact on residents and the associated mitigation measures to be undertaken by the proponent
- the methods that will be used to communicate with affected residents.

### 5.10.3. Noise mitigation measures

Noise and vibration impact analysis should include:

- proposals to minimise or eliminate these effects, including details of any screening, lining, enclosing or bunding of facilities, or timing schedules for construction and operations that would minimise environmental harm and environmental nuisance from noise and vibration
- options for sensitive receptors that are otherwise unable to achieve a satisfactory internal noise level for the preservation of health and wellbeing as identified within the EPP (Noise).

## 5.11. Waste

### 5.11.1. Waste generation

Provide details of waste management strategies (including reduction, re-use, recycling, storage, transport and disposal of waste). Demonstrate that waste minimisation and cleaner production techniques and designs will be implemented to prevent or minimise environmental impacts when selecting processes, equipment and facilities.

Identify and describe all sources, likely volumes and quality (where applicable) of waste associated with pre-construction, construction, operation and decommissioning of all aspects of the project. Refer to regulated waste listed in Schedule 7 of the Environmental Protection Regulation 2008 (Qld).

Describe:

- waste generated by delivery of material to site(s)
- all chemical and mechanical processes conducted on the construction sites that produce waste
- the amount and characteristics of solid and liquid waste produced on-site by the project
- hazardous materials to be stored and/or used on site, including environmental toxicity data and biodegradability
- 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, including extent of use of local government facilities
- methods proposed to recycle waste oil and waste oil containers
- how the facilities required for the collection, storage and disposal of any waste originating from the mining lease will minimise the potential for the attraction of vermin and insects.

## 5.11.2. Waste management

Provide details of waste management strategies (including reduction, re-use, recycling, storage, transport and disposal of waste). Demonstrate that waste minimisation and cleaner production techniques and designs will be implemented to prevent or minimise environmental impacts when selecting processes, equipment and facilities.

Provide information on the variability, composition and generation rates of all waste produced at the site and processing plant.

Provide details of cleaner production waste management planning, especially how these concepts will be applied to prevent or minimise environmental impacts at each stage of the proposal. Discuss measures to improve natural resource-use efficiency (for example, energy and water), integrated processing design, any co-generation of power and by-product re-use as shown in a material/energy flow analysis.

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

Provide information on air emissions, including particulates, fumes and odours, during the construction and operation stages of the project. Particulate emissions include those that would be produced by any industrial process, or disturbed by wind action on stockpiles and conveyors, or by transportation equipment (for example, trucks, either by entrainment from the load or by passage on unsealed roads). The methods to be employed to mitigate impacts from air emissions should be described in Section 5.8 (page 38).

Describe and show the location, design and methods for constructing dumps for waste rock and subsoil. Show the location of the dumps on a map relative to topography and other natural features of the area.

Describe the tailings waste produced by preparation and/or processing plants and the proposed methods for its disposal. Describe alternative options for tailings disposal including the proposed location, site suitability and volume of any tailings storage and/or disposal site(s), including the method of construction. Describe the:

- approximate quantity of tailings to be produced by the project and its processing plant annually for the life of the mine; also present tailings characterisation information in this section
- construction of the tailings storage facility with regards to construction material and design; and how the tailings storage facility complies with relevant codes for the construction of such containment systems
- strategies to monitor and manage seepage into ground and surface waters. Discuss the location of the storage and/or disposal site with regard to adjacent creeks and rivers.

Solid waste disposal—describe the quantity and quality of solid wastes (other than waste rock, subsoil and tailings addressed in other sections) and the proposed methods of their disposal. Show the proposed location, site suitability, dimensions and volume of any landfill, including its method of construction.

Liquid waste—present a description of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the project other than that addressed



in other sections. Pay particular attention 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 may need to consider the following effects:

- domestic sewage treatment—disposal of liquid effluent and sludge
- water supply treatment plant—disposal of wastes.

### **5.11.3. Management approach**

Having regard for the *Waste Reduction and Recycling Act 2011*, indicate the results of investigation into the feasibility of using waste minimisation and cleaner technology options during all phases of the project. EHP 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 methane, 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.

## **5.12. Transport**

Present the road transport assessment for road transport as appropriate for each phase of the project. This report should provide sufficient information to allow an independent assessment of how existing road transport infrastructure will be affected by project transport at the local and regional level.

### **5.12.1. Existing infrastructure**

Describe the extent, condition and capacity of the existing road transport infrastructure on which the project will depend.

Include maps (at appropriate scales and level of detail) of the existing state-controlled road network identifying the state-controlled road network and other major inventory features (for example, bridges along the state-controlled road network) to help establish the context of the site in relation to the network.

### **5.12.2. Transport activities and routes—freight**

Provide a broad summary of road freight tasks (inputs and outputs, including wastes) associated with all phases of the project. The summary will be in tabular form (or other suitable format) and include for each task:

- tonnage/volume
- proposed transport methodologies (modes, vehicle types, payloads)
- estimates of the number of discrete trips required for each task
- origins of inputs and destinations of outputs (including wastes)

Cross-reference to the relevant section in the EIS where the task is fully described and/or assessed.

### 5.12.3. Traffic generation

For road transport and each phase of the project, provide traffic generation information on:

- existing background traffic including volumes, composition, peak traffic and peak times along the transport routes to and from the project
- background traffic growth for the transport routes for all stages of the project life
- the construction of any project-related plant and utilities within or impacting on the jurisdiction of any transport authority
- the stages, timing and duration of each stage/phase and how these impact on the transport-related infrastructure
- comparison of the traffic situation and road conditions with and without the project
- expected volumes of project inputs and outputs of transported plant, construction materials and operational equipment, waste and hazardous goods for all phases of the project
- how identified project inputs and outputs will be moved through the local and regional transport network (including number and type of vehicles, mode, volume, composition, trip timing and routes)
- traffic generated by construction and operational workforce personnel including visitors (volume, composition, timing and routes) and likely accommodation facilities
- likely heavy, oversized and indivisible loads (volume, composition, timing and routes) highlighting any vulnerable bridges and structures along proposed routes.

Provide traffic data to allow cumulative impacts of the project and nearby major development projects to be assessed. Data to be provided includes average two-way peak hour volumes.

Describe the access locations (existing and proposed) to state-controlled roads.

Discuss and recommend how identified impacts will be mitigated so as to maintain safety, efficiency and condition of roads. These mitigation strategies are to be prepared in close consultation with the Queensland Police Service, emergency services and relevant transport authorities (including local government), consider those authorities' works program and forward planning, and be in accordance with the relevant transport authorities' methodologies and design manuals.

### 5.12.4. Road management planning

Outline:

- procedures and timing for assessing and agreeing on the scope of required mitigation works with road corridor managers (for example, maintenance or upgrades), including any associated works, such as sourcing water and gravel
- strategies and timing to minimise the effects of project transport on existing and future public road corridors

- steps to be taken to prevent access from public roads to the project sites
- strategies to maintain safe access to public road reserves to allow road/rail/pipeline maintenance activities
- process for decommissioning any temporary access to road reserves, for example, stockpile sites.

Findings of studies and transport infrastructure impact assessments should be an input into preparing a draft road-use management plan.

### 5.12.5. Air service management planning

Describe the air services and their current capacity serving the region. Estimate the project's requirements for air transport to and from these regions, and the services required to supply these projections. Provide an assessment of the infrastructure needed to support the projected level of air services.

## 5.13. Cultural heritage

Assess the project against relevant legislation including:

- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Australian Heritage Council Act 2003*
- *Aboriginal Cultural Heritage Act 2003*
- *Queensland Heritage Act 1992*
- The Burra Charter.

### 5.13.1. Indigenous cultural heritage

#### Cultural heritage management plan

Unless an exemption applies under section 86 of the Aboriginal Cultural Heritage Act 2003 (ACH Act), a Cultural Heritage Management Plan (CHMP) must be prepared in accordance with the requirements of Part 7 of that Act. The gazetted Cultural Heritage Management Plan Guidelines may assist in the development of the CHMP.

During the EIS process, the proponent should initiate a CHMP under the ACH Act and make the EIS project manager aware of the progress of the CHMP approval process and of any related issues that should be addressed in the EIS assessment report. An approved CHMP in a form that complies with Part 7 of the ACH Act will ensure that the project meets the Aboriginal cultural heritage duty of care imposed by the ACH Act.

If a CHMP has not been approved when the EIS is submitted to the Coordinator-General details of the proposed steps and timeframes for finalising the CHMP must be provided.

#### Native title

Identify areas covered by applications for native title claims or native title determinations, providing boundary descriptions of native title representative body(ies),

and whether it is necessary to notify the representative body(ies) or if there is evidence that native title does not exist.

Identify the potential for native title rights and interests likely to be impacted upon by the project and the potential for managing those impacts by an Indigenous land use agreement or other native title compliance outcomes.

### **5.13.2. Non-Indigenous cultural heritage**

Include a description of potential non-indigenous cultural heritage values within the study area.

Describe the potential significance of artefacts, items or places of conservation or non-Indigenous cultural heritage value likely to be affected by the project and their potential values at a local, regional, state and national level.

Any such assessment should be conducted by an appropriately qualified cultural heritage practitioner and should include the following:

- a review of:
  - the Australian Heritage Places Inventory
  - the Queensland Heritage Register and other information regarding places of potential non-Indigenous cultural heritage significance
  - any local government heritage register
  - any existing literature relating to the heritage of the affected areas
- liaison with relevant community groups/organisations (for example, local historical societies) concerning places of non-Indigenous cultural heritage significance located or identified
- locations of culturally and historically significant sites, shown on maps, which could potentially be impacted by the project
- analysis of the proposed development area to identify and record non-Indigenous cultural heritage places.

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

Provide an assessment of any likely effects on potential sites of non-Indigenous cultural heritage values.

Provide strategies to mitigate and manage any negative impacts on non-Indigenous cultural heritage values and enhance any positive impacts.

As a minimum, investigation, consultation, impact assessment, management and protection strategies should satisfy statutory responsibilities and duties of care.

## **6. Social values**

Conduct a social impact assessment (SIA) in consultation with the Coordinated Project Delivery Division in the office of the Coordinator-General (OCG). Matters to be considered in the SIA are detailed in the following sections.

The construction and operation of the project should aim to meet the following objectives:

- avoid or mitigate adverse social and economic impacts arising from the project
- capitalise on social and economic opportunities potentially available to affected communities.

In accordance with the Coordinator-General's *Social impact assessment guideline* (July 2013), describe the likely social impacts (positive and negative) on affected communities taking into account proposed mitigation measures. Proponents should consult OCG about the application of SIA as this will vary on a case-by-case basis, depending on the duration and extent of potential social impacts.

The SIA should provide:

- a definition of the stakeholders and impacted communities of interest
- a social baseline study of the impacted communities of interest
- an overview of state government legislation and policies that complement the mitigation measures for social impacts that are directly related to the project
- an explanation of methods used to gather information including a description of how the communities of interest were engaged during the development of the SIA
- identification of potential direct social impacts and prediction of the significance of any impacts and duration and extent of each impact
- the proponent's proposed enhancement and mitigation measures
- the proponent's monitoring framework that informs stakeholders on the progress of the enhancement and mitigation measures.

Components to be considered as part of an SIA include:

- community and stakeholder engagement
- workforce management
- housing and accommodation
- local business and industry content
- health and community wellbeing.

## **6.1. Description of existing social values**

A social baseline study should be compiled from qualitative and quantitative data that has been compared, aligned and analysed using appropriate social science research methods. Broad data categories may include:

- community history and culture
- population
- workforce participation, employment and diversity profile
- housing and accommodation
- education and training
- business, industry and economy
- income and cost of living

- social infrastructure
- technology
- community health and safety
- transportation and access
- other including socio-economic advantage and resilience, relevant economic modelling and cumulative impact data.

Data should be supported by recent on-the-ground research.

## **6.2. Potential impact and mitigations**

Assess and describe the type, level and significance of the project's social impacts, benefits and opportunities on the local area, based on outcomes of community engagement processes and the social baseline study.

This should include sufficient data to enable affected local and state authorities to make informed decisions about the project's effects. The potential opportunities and impacts will be identified by considering the potential changes to key areas included in the social baseline study.

Impact assessment should include:

- estimates of population growth and population forecasts resulting from the proposal
- outcomes of community engagement processes including the likely response of the affected communities, including Indigenous people
- an assessment of the size, significance, and likelihood of impacts at the local and regional level, considering population and demographic changes, lifestyles, community values, housing, local and regional planning outcomes, social infrastructure, and the health and social wellbeing of families and communities.

Social impact mitigation strategies and measures must include:

- the impacts documented in the SIA
- description of the mitigation and management strategies
- outcomes, performance indicators and targets
- significant stakeholders
- timing/timeframes
- monitoring framework.

The assessment should identify opportunities to mitigate negative impacts and capture the local and regional benefits of the project, including:

- strategies for ensuring local suppliers of goods and services receive full, fair and reasonable opportunity to tender for work throughout the life of the project through adopting policies such as the Queensland Resources and Energy Sector Code of Practice for Local Content, administered by Queensland Resources Council
- employment strategies for local residents including members of Indigenous communities and people with a disability which also lead to the acquisition of skills which will secure ongoing employment within the resources industry

- any recruitment and training programs to be offered.

In assessing and determining appropriate mitigation measures, proponents will consider whether the social opportunities and impacts are accurately, reasonably and reliably able to be attributable to:

- the project
- a cumulative impact where the proportion of the impact of the project can be readily and reasonably forecast and/or separated from the total cumulative impact or opportunity.
- an existing issue, legacy or cumulative impact which is not attributed to the project

Impact mitigation measures are required in the first two instances only.

### **6.2.1. Cumulative impacts**

Evaluate and discuss the potential cumulative social impacts resulting from the project including an estimation of the overall size, significance and likelihood of those impacts. Cumulative impacts, in this context, is defined as the additional impacts on population, workforce, accommodation, housing, and use of community infrastructure and services, from the project, and other proposals for development projects in the area, which are publicly known or communicated by OCG, if they overlap the proposed project in the same timeframe as its construction period.

Discuss the concept of longitudinal cumulative impacts, or 'project fatigue', where the community in the study area has been subject to a number of large-scale construction projects in recent years.

## **7. Economic impacts**

Describe the likely impacts (positive and negative) of the project on the economies materially impacted by the project. The analysis should describe the economic impacts including estimated costs, if material, on industry and the community.

### **7.1. Description of affected local and regional economies**

Describe the existing economy in which the project is located and the economies materially impacted by the project. A baseline assessment of the existing economic characteristics of the identified study areas for the relevant project components should be developed detailing a range of economic and demographic statistics, including population, labour force, employment, housing and land data, and economic indicators.

### **7.2. Potential impacts and mitigations**

Proponents should quantify economic impacts where suitable data and methodology can be applied. Otherwise, these should be assessed qualitatively.

The assessment should be based on a potential development scenario which estimates a construction commencement date, the construction and operational

timeframes, and capital and operational expenditure for relevant components of the project.

The economic impacts should consider local, regional, state and national factors that may have a material effect on local and regional impacts and should assess the construction and operations phases of the project.

The analysis should describe economic impacts including:

- estimated costs, if material, on industry and the community, including property values, industry output and employment
- any indirect impacts arising from the project should be assessed qualitatively, unless a suitable method for undertaking a quantitative assessment can be provided.
- the implications of the project for future development, including the potential impact on extractive resource availability in the regions, any economic consequences for the regions and the distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups.

## 8. Hazard and risk

### 8.1. Hazard and risk assessment

Describe the potential hazards and risks to people and property that may be associated with the project.

Assess the potential health, safety, and risk issues associated with the project's construction, operation, and decommissioning phases. Potential risks of the project to health and safety of project employees, the public and the environment are to be assessed, and controls and mitigation strategies are outlined where appropriate.

Undertake a high level assessment to the potential health and safety of employees.

Undertake a preliminary risk assessment for all components of the project, as part of the EIS process in accordance with the principal legislative and regulatory requirements relevant to hazard identification, risk assessment and health and safety, as follows:

- *Coal Mine Safety and Health Act 1999*
- *Coal Mine Safety and Health Regulation 2001* (CMSH Regulation)
- *Transport Infrastructure Act 1994*
- Australian Dangerous Goods Code 2008 (ADG Code) (Department of Infrastructure and Transport 2008).

With respect to risk assessment, the EIS must:

- deal comprehensively with external and on-site risks including transport risks
- assess risks during the pre-construction, construction, operational and decommissioning phases of the project
- include an analysis of the consequences of each hazard on safety in the project area, examining the likelihood of both individual and collective consequences, involving injuries and fatalities to workers and to the public



- present quantitative levels of risks from the above analysis.

Provide details on the safeguards that would reduce the likelihood and severity of hazards, consequences and risks to persons, within and adjacent to the project area(s).

Present a comparison of assessed and mitigated risks with acceptable risk criteria for land uses in and adjacent to the project area(s).

Identify the residual risk following application of mitigation measures. Present an assessment of the overall acceptability of the impacts of the project in light of the residual uncertainties and risk profile.

### **8.1.1. Dangerous goods and hazardous substances**

Conduct a hazard identification study to identify the nature and scale of hazards that might occur during the construction and operation of the project. This would be expected to include hazards involving:

- construction accidents
- pipeline, processing unit or storage vessel rupture or loss of containment, and explosions and fires associated with such incidents
- release to the environment of liquid gaseous or particulate pollutants or any other hazardous material used, produced or stored on the site
- spills of materials during loading, unloading and transport.

## **8.2. Health and safety**

### **8.2.1. Description of public health and safety community values**

Describe the existing health and safety values of the community, workforce, suppliers and other stakeholders in terms of the environmental factors that can affect human health, public safety and quality of life, such as air pollutants, odour, lighting and amenity, dust, noise, water, disease vectors, pests and vermin.

Describe how potable water will be treated, stored and tested in accordance with the microbiological, physical and chemical standards stipulated in *Australian Drinking Water Guidelines Paper 6, National Water Quality Management Strategy* (Australian Government 2011).

Provide a description of existing health services in the neighbouring community/towns.

### **8.2.2. Hazard mitigation measures**

Define and describe the objectives and practical measures for protecting or enhancing health and safety community values. Describe how nominated quantitative standards and indicators may be achieved for social impact management, and how the achievement of the objectives will be monitored, audited and managed.

Describe the potential cumulative effects on public health values and occupational health and safety impacts on the community, workforce and regional health services from project operations and emissions. Recommend any practical monitoring regimes in this section.

Consistent with the requirements of the SIA, include relevant consultation with the appropriate regional health service providers. Provide:

- information on the provision of health care facilities for project personnel at the mine site and personnel at the accommodation village. Where medical facilities are to be provided it must be noted that the requirements of the Health (Drugs and Poisons) Regulations 1996 will be applicable
- a description of how the proponent will manage the delivery of health services and/or support/strengthen local health services. Specify how health services will be provided to the workforce and/or how the proponent intends to support local health services
- an outline of the proposed arrangements with local services and those provided by the relevant Health Services regarding emergency management protocols and procedures information on how utilities (water, electricity, gas) serving health facilities will be managed and distributed (if applicable).

## 9. Emergency management

Present preliminary information on the design and operation of proposed safety/contingency/notification systems to address significant emergency issues delineated in the risk assessment, together with at least the following areas of emergency:

- fire prevention/protection
- leak detection/minimisation
- release of contaminants
- emergency shutdown systems and procedures
- natural disasters
- on-site drinking water incident.

In addition, undertake an assessment of businesses that may be affected in the event of an emergency, including strategies to mitigate the impact on these businesses. In regard to fires, outline strategies to manage the provision of:

- fire management systems to ensure the retention on-site of fire water or other fire
- suppressants used to combat emergency incidents
- building fire safety measures for any construction or permanent accommodation details of any emergency response plans and bushfire mitigation plans under the State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (Department of Local Government and Planning & Department of Emergency Services 2003) or any relevant state planning policies
- on-site firefighting equipment provided and the level of training of staff who will be tasked with emergency management activities

- detailed maps showing the plant outline, potential hazardous material stores
- incident control points, firefighting equipment and the like
- an outline of any dangerous goods stores associated with the plant operations
- including fuel storage and emergency response plans.

Present outlines of emergency planning and response strategies, including a protocol to identify and notify relevant parties, to deal with relevant incidents above, which have been determined in consultation with state and regional emergency service providers, and which show integration of emergency services into the plans.

Present plans for emergency medical response and transport and first aid matters with involvement of the relevant state agencies (such as the Queensland Ambulance Service, Queensland Fire and Rescue Service, Emergency Management Queensland and Queensland Police Service).

## 10. Cumulative impacts

Summarise and assess the project's cumulative impacts using quantitative approaches where possible and describe these impacts in combination with those of existing or proposed project(s) publicly known or advised by the office of the Coordinator-General to be in the region, to the greatest extent practicable.

Assess cumulative impacts with respect to both geographic location and environmental values. In particular, address cumulative impacts in sensitive environmental areas identified in Section 5.5.1 of this TOR.

Explain the methodology used to determine the cumulative impacts of the project, detailing the range of variables considered (including relevant baseline or other criteria upon which the cumulative aspects of the project have been assessed, where applicable).

## 11. Sustainable development

Provide a comparative analysis of how the project conforms to the objectives for 'sustainable development'—see the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992).

Consider the cumulative impacts (both beneficial and adverse) of the project from a life-of-project perspective, taking into consideration the scale, intensity, duration and frequency of the impacts to demonstrate a balance between environmental integrity, social development and economic development.

This information is required to demonstrate that sustainable development aspects have been considered and incorporated during the scoping and planning of the project.

## 12. Conclusions and recommendations

Make conclusions and recommendations with respect to the project, based on the studies presented, and conformity of the project with legislative and policy requirements.

## 13. References

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

## 14. Appendices

Provide the following as appendices to the EIS:

- final TOR for this EIS
- TOR cross-reference table, which links the requirements of each section/Section of the TOR with the corresponding section/Section of the EIS, where those requirements have been addressed
- a list of the project approvals required by the project
- the consultation report, as described in Section 3.9.2 (page 8)
- a list of the relevant qualifications and experience of the key study team members and specialist sub-consultants
- a glossary of technical terms
- a list of abbreviations
- any reports of specialist studies undertaken as part of the EIS
- a copy of the proponent's corporate environmental policy and planning framework document
- a list of all commitments made by the proponent in the EIS, with cross-references to the relevant section in the EIS
- a copy of the proponent's land acquisition protocols.

# Content of the EIS for matters of national environmental significance

## 1. Background and context

On 20 June 2013 a delegate of the Commonwealth Environment Minister determined the project is a 'controlled action' under the EPBC Act, due to the likely significant impacts on MNES (reference number EPBC 2013/6865). The controlling provisions under the EPBC Act are:

- listed threatened species and communities (sections 18 and 18A).

The EIS must meet the impact assessment requirements under both Commonwealth and Queensland legislation and provide enough information for the Commonwealth Environment Minister to make an informed decision on whether or not to approve the project under the EPBC Act. The project will require approval from the responsible Commonwealth minister under Part 9 of the EPBC Act before it can proceed.

Once the EIS has been prepared to the satisfaction of the Coordinator-General and MNES addressed to the satisfaction of the Australian Government, the EIS will be made available for public comment.

The proponent may be required by the Coordinator-General or the Commonwealth Environment Minister to provide additional material to address matters raised in submissions on the EIS.

At the conclusion of the environmental assessment process, the Coordinator-General will provide a copy of the report to the Commonwealth Environment Minister, in accordance with Part 5, section 17(2) of the State Development and Public Works Organisation Regulation 1999.

After receiving the evaluation report and sufficient information about the relevant impacts of the action, the Commonwealth Environment Minister has 30 business days to decide whether or not the impacts from the project on MNES are acceptable, and therefore decide whether or not to approve each controlling provision.

The Commonwealth Environment Minister's decision is separate to the approval decisions made by Queensland state agencies and other agencies with jurisdiction on state matters.

Consideration should be given to any relevant policy statements available from the website of the Department of Sustainability, Environment, Water, Population and Communities, including:

- *Matters of National Environmental Significance: Significant impact guidelines 1.1*, (Commonwealth of Australia 2009)
- *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (Commonwealth of Australia 2012a).

## 2. Content of the EIS

### 2.1. General requirements

The EIS must:

- assess all the relevant impacts that the action has, will or is likely to have on listed threatened species and ecological communities
- provide enough information about the action and its relevant impacts to allow the Commonwealth Environment Minister to make an informed decision whether or not to approve the action
- address the matters set out in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cwlth) (EPBC Regulations).

The body of the draft EIS is to be written in clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible.

This section should bring together assessments of impacts on MNES from other chapters (for example, water resources, flora and fauna, cultural heritage and cumulative impacts) and produce a stand-alone assessment in a format suited for assessment under the EPBC Act.

The project should initially be assessed in its own right followed by an assessment of the cumulative impacts related to all known proposed similar developments in the region with respect to each relevant listed threatened species or community and all identified consequential actions. Cumulative impacts not solely related to the project development should also be assessed.

Predictions of the extent of threat (risk), impact and the benefits of any mitigation measures proposed, should be based on sound science and quantified where possible. Reference all sources of information relied upon and provide an estimate of the reliability of predictions. Also identify and evaluate any positive impacts.

The extent of any new field work, modelling or testing should be commensurate with risk and should be such that when used in conjunction with existing information, provides sufficient confidence in predictions that well-informed decisions can be made.

Project alternatives must be discussed in accordance with Schedule 4, section 2.01(g) of the EPBC Regulations.

The following content requirements are based on these matters and considerations, with the addition of directions specific to the proposed action and the receiving environment.

### 2.2. Specific requirements

#### 2.2.1. Impact on a listed threatened species and communities

Consider and assess the impacts to the listed threatened species and ecological communities and any others that are found to be or may potentially be present in areas that may be impacted by the project. Identify which component of the project is of

relevance to each listed threatened species or ecological community or if the threat of impact relates to consequential actions, resulting from:

- a decrease in the size of a population or a long-term adverse effect on an ecological community
- reduction in the area of occupancy of the species or extent of occurrence of the ecological community
- fragmentation of an existing population or ecological community
- disturbance or destruction of habitat critical to the survival of the species or ecological community
- disruption of the breeding cycle of a population
- modification, destruction, removal, isolation or reduction of the availability or quality of habitat to the extent that the species is likely to decline
- modification or destruction of abiotic (non-living) factors (such as water, nutrients or soil) necessary for the ecological community's survival
- the introduction of invasive species that are harmful to the species or ecological community becoming established
- interference with the recovery of the species or ecological community
- action that may be inconsistent with a recovery plan.

Identify and evaluate any positive impacts.

The draft EIS must enable interested stakeholders and the Minister to understand the consequences of the proposed action on listed threatened species and communities.

When assessing impacts on listed threatened species and communities, the following information must be provided for each relevant species or community:

- discuss the relevant species or community in respect of known threats and those threats posed by the proposed action. When describing the values of an area, reference should be made to the criteria through which the entity was listed and a discussion of impacts be made against the criteria
- clearly describe the methodologies used to determine the likely presence/absence of the relevant species or community
- quantify and discuss likely direct, indirect and downstream impacts from the proposed action, including from potential subsidence. Where conclusions are made based on technical reports located elsewhere in the documentation there should be sufficient information in this chapter to support the conclusions provided on potential and actual impacts
- identify relevant matters on maps with locations of infrastructure proposed. Additional maps showing survey locations and vegetation analysis should also include proposed and existing infrastructure elements
- describe and assess the effectiveness of avoidance and mitigation measures to deal with relevant impacts for each species or community, and the anticipated benefit of these measures
- quantify and discuss residual impacts

- make an assessment on the level of impact and its acceptability, and provide a rationale for this assessment
- for any residual significant impacts, the proponent must propose offsets to compensate for these impacts that are in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environment Offsets Policy* and associated *Offsets Assessment Guide*.

Surveys conducted for the project must demonstrate that they comply with relevant Commonwealth survey guidelines, unless adequate justification for alternative survey methodology can be provided.



# Acronyms and abbreviations

<b>Acronym/abbreviation</b>	<b>Definition</b>
ACH Act	<i>Aboriginal Cultural Heritage Act 2003 (Qld)</i>
AS/NZS	Australian standard/New Zealand standard
CHMP	cultural heritage management plan
DEHP	Department of Environment and Heritage Protection, Queensland
EIS	environmental impact statement
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EPP	environmental protection policy (water, air, waste, noise)
ERA	environmentally relevant activity
JAMBA	Japan–Australia Migratory Bird Agreement
MNES	matters of national environmental significance (under the EPBC Act)
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
NGA	National Greenhouse Accounts
NT agreement	native title agreement
SRE	regional ecosystem (for a definition, refer to the Glossary)
REDD	Regional Ecosystem Description Database
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
SCL Act	<i>Strategic Cropping Land Act 2011 (Qld)</i>
SDPWO Act	<i>State Development and Public Works Organisation Act 1971 (Qld)</i>
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SIA	social impact assessment
SPA	<i>Sustainable Planning Act 2009 (Qld)</i>
The proponent	BM Alliance Coal Operations Pty Ltd
TOR	terms of reference
VM Act	<i>Vegetation Management Act 1999 (Qld)</i>
Water Act	<i>Water Act 2000</i>

# Glossary

Term	Definition
afflux	A flow to or toward an area.
aquifer	A water bearing stratum of permeable rock, sand, or gravel, able to transmit substantial quantities of water.
assessable vegetation	Vegetation in which clearing is assessable development under Schedule 3, Part 1, Table 4, Item 1 of SPA.
benthic substrate	Pertaining to the bottom of a body of water.
bilateral agreement	The agreement between the Australian and Queensland governments, which accredits the State of Queensland's EIS process. It allows the Commonwealth Environment Minister to rely on specified environmental impact assessment processes of the State of Queensland in assessing actions under the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth).
biodiversity	Biodiversity is short for 'biological diversity'. It describes the natural diversity of native wildlife, together with the environmental conditions necessary for their survival and includes: <ol style="list-style-type: none"> <li>a) regional diversity, that is, the diversity of the landscape components of a region, and the functional relationships that affect environmental conditions within ecosystems</li> <li>b) ecosystem diversity, that is, the diversity of the different types of communities formed by living organisms and the relations between them</li> <li>c) species diversity, that is, the diversity of species</li> <li>d) genetic diversity, that is, the diversity of genes within each species.</li> </ol>
bunding	An artificial created boundary, usually in the form of an embankment used to prevent sediment and substances from entering a water stream or storage facility.
community	An assemblage of interdependent populations of different species (plants and animals) interacting with one another, and living in a particular area.
controlled action	A proposed action that is likely to have a significant impact on a matter of national environmental significance; the environment of Commonwealth land (even if taken outside Commonwealth land); or the environment anywhere in the world (if the action is undertaken by the Commonwealth). Controlled actions must be approved under the controlling provisions of the EPBC Act.
controlling provision	The matters of national environmental significance, under the EPBC Act, that the proposed action may have a significant impact on.
coordinated project	A project declared as a 'coordinated project' by the Coordinator-General, under section 26 of the SDPWO Act. Prior to 21 December 2012, coordinated projects were known as 'significant projects'.
Coordinator-General	The corporation sole constituted under section 8A of the <i>State Development and Public Works Organisation Act 1938</i> and preserved, continued in existence and constituted under section 8 of the SDPWO Act.
CORVEG	Queensland Herbarium's site based floristic dataset containing field survey data
ecosystem	A biophysical environment containing a community of organisms.

effluent	Outflow of treated wastewater.
ephemeral	Transitory, short-lived.
endangered	A species is endangered if: <ul style="list-style-type: none"> <li>• there have not been thorough searches conducted for the wildlife and the wildlife has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife, or</li> <li>• the habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction, or</li> <li>• the population size of the wildlife has declined, or is likely to decline, to an extent that the wildlife may be in danger of extinction, or</li> <li>• the survival of the wildlife in the wild is unlikely if a threatening process continues.</li> </ul>
endemism	The ecological state of being unique to a defined geographic location, such as an island, nation or other defined zone, or habitat type.
erosion	The process by which rocks are loosened, worn away and removed from parts of the earth's surface.
fluvial	Of, relating to, or inhabiting a river or stream.
geomorphological	The form or shape of the landscape and the processes that modify or change it.
groundwater	Water found underground in porous rock or soil strata.
habitat	The biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms.
Habitat corridor	A strip of habitat that facilitates fauna movement between otherwise isolated patches of habitat.
lacustrine environments	A lake or lake-like environment. Wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or dammed river channel; (2) lacking trees, shrubs, persistent emergent plants, mosses, or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres).
listed species	A plant or animal included in a schedule of vulnerable, rare or endangered biota, such as the schedules in the EPBC Act or the Nature Conservation (Wildlife) Regulation 2004 (Qld).
mitigation	The effort to eliminate or reduce impacts.
morphology	Form and structure of organisms without consideration of function.
native species	A species that is indigenous to Australia or an external territory, or periodically or occasionally visits.
native wildlife	Any taxon or species of wildlife indigenous to Australia.
natural environment	The complex of atmospheric, geological, and biological characteristics found in an area in the absence of artefacts or influences of a well-developed technological human culture.
palaeontologic	The study of fossils to determine the structure and evolution of extinct animals and plants.
palustrine wetland	Include nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses
permeability	The capacity of a material (rock) to transmit fluids (groundwater).
porosity	That fraction of total rock volume which is filled with water, gas, or oil.

proponent	The entity or person who proposes a coordinated project. It includes a person who, under an agreement or other arrangement with the person who is the existing proponent of the project, later proposes the project.
regional ecosystems (REs)	Regional ecosystems were defined by Sattler and Williams (1999) as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
regrowth	A young, usually even-aged forest stand that has regenerated after disturbance.
rehabilitation	Making the land useful again after a disturbance. It involves the recovery of ecosystem functions and processes in a degraded habitat.
remnant vegetation	Vegetation, part of which forms the predominant canopy of the vegetation: <ul style="list-style-type: none"> <li>• covering more than 50 per cent of the undisturbed predominant canopy</li> <li>• averaging more than 70 per cent of the vegetation's undisturbed height</li> <li>• composed of species characteristic of the vegetation's undisturbed predominant canopy.</li> </ul>
riparian	Pertaining to, or situated on the bank of, a body of water, especially a watercourse such as a river.
run-off	The amount of rainfall which actually ends up as stream flow, also known as rainfall excess.
sediment	Any usually finely divided organic and/or mineral matter deposited by air or water in non-turbulent areas.
sensitive receptor	Those locations or areas where dwelling units or other fixed, developed sites of frequent human use occur.
sodic soil	A sodic soil is defined as one in which more than 10–15 per cent of the clay's negative charge is balanced by sodium ions.
stratigraphy	Rock strata, especially the distribution, deposition, and age of sedimentary rocks.
terrestrial	Pertaining to land, the continents, and/or dry ground. Contrasts to aquatic.
under stress	Aquifer water level conditions as defined by DEHP
visual absorption capacity	The landscape's ability to absorb physical changes without transformation in its visual character and quality. The intrinsic capacity of a landscape unit to dissimulate the industrial structures of a specific project without compromising its unique character.
water asset	Water, or the rights or other claims to water, which the water report entity either holds, or for which the water report entity has management responsibilities, and from which an individual or organisation that is a water report entity, or a group of stakeholders of a physical water report entity, derives future benefits (as defined in Exposure Draft of Australian Water Accounting Standard 1 (2010)—Water Accounting Standards Board)

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