The Coordinator-General

# Pisolite Hills project

## Terms of reference for an environmental impact statement

December 2012

Queensland Government

# Contents

# Preamble

Cape Alumina Limited proposes to develop the Pisolite Hills project (the project), which has been declared a 'significant project' by the Coordinator-General. The project components to be assessed include:

- construction and operation of an open cut bauxite mine producing 7 million tonnes per annum of dry-product utilising a conventional open-pit bench mining operation
- mine support infrastructure including office and ancillary buildings, workshops, fuel storage and beneficiation plant
- construction and operation of the bauxite stockpile, a barge loading facility, causeway with loading conveyor, and mine village, to be located adjacent to the proposed port facility on the Ducie River
- 260-person accommodation camp, on-site power generation, a potable water treatment plant and a sewerage treatment plant
- a transport corridor from the south-west, an upgrade of the existing airstrip at the Mapoon township and a barge supply access terminal to the project
- barging and transhipping operations.

On 2 October 2012, the Coordinator-General declared the project to be a 'significant 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.

The declaration of the project as a 'significant project' does not indicate support for or approval of the project by the Coordinator-General or the Queensland Government. Rather, it is a requirement for the project to undergo a rigorous EIS process.

The project was referred to the Australian Government for a determination as to whether the project constituted a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act), due to the likely potential impacts on matters of national environmental significance (MNES).

On 26 March 2008, the then Commonwealth Minister for Environment determined the project is a 'controlled action' due to potential impacts upon MNES (EPBC reference 2008/4046).

The controlling provisions under the EPBC Act are:

- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A)
- Commonwealth marine areas (sections 23 and 24A).

Therefore, the project requires assessment and approval under the EPBC Act. The Australian Government is conducting a separate, but parallel, assessment process under the EPBC Act.

On 3 April 2009, the Australian Government finalised the guidelines for the content of the EIS. As these guidelines address MNES requirements, they are not detailed in this

TOR. The draft TOR was released for public and advisory agency comment for 20 business days from 6 October 2012 to 5 November 2012. Twenty-five submissions were received—18 from advisory agencies and 7 from private organisations and individuals.

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** or from the EIS project manager.

# Content of the EIS

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

The EIS should follow the format and content outlined in this TOR. Any proposed change to the overall structure of the EIS documents should be discussed 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:

- project title
- 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
- a concise statement of the aims and objectives of the project
- the legal framework for the project, decision-making authorities and advisory agencies
- an outline of the background and need for the project, including the consequences of not proceeding with the project
- an outline of the alternative options considered and reasons for selecting the proposed development option
- a brief description of the project (pre-construction, construction, operational activities and decommissioning) and the existing environment, using visual aids where appropriate
- 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
- a discussion of the cumulative impacts in relation to social, economic and environmental factors of associated infrastructure projects proposed within the region
- detailed maps of the proposed project location and any other critical figures.

## 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. Project proponent

Describe the proponent's experience, including:

- the nature and extent of business activities
- experience and qualifications
- environmental record, including a list of any breach of relevant environmental laws during the previous ten years
- the proponent's environmental, health, safety and community policies.

## 3.2. Project description

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 (refer to page 14).

## 3.3. 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.

## 3.4. 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.

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.

## 3.5. 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.

## 3.6. The environmental impact assessment process

### 3.6.1. Methodology of the EIS

Provide an outline of the environmental impact assessment process, including the role of the EIS in the Coordinator-General's decision making process. Include information on relevant stages of EIS development, 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.

### 3.6.2. Objectives of the EIS

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 environmental management plan (EMP).

### 3.6.3. 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.

## 3.7. Public consultation process

### Overview

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.

### Consultation plan

Develop and implement a comprehensive and inclusive consultation plan with the stakeholder groups identified in section 3.2 of *Preparing an EIS: Guideline for proponents*.

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 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.

### Public consultation report

Include, as an appendix, 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 parties (as defined by 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 (also outlined and included in the EMP)

- a summary of the issues raised by 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).

## 3.8. Project approvals

### 3.8.1. 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 at the time the EIS is submitted. Identify all approvals, permits, licences and authorities that will need to be obtained for the proposed project. Outline the triggers for the application of each of these and identify relevant approval requirements.

**Australian Government legislation**

Relevant legislation may include, but is not limited to:

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1994*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Maritime Transport and Offshore Facilities Security Act 2003*
- *Native Title Act 1993.*

**Australian Government obligations**

Identify and outline obligations relevant to the project which may include:

- protection of World Heritage values
- migratory animals (China–Australia Migratory Bird Agreement (CAMBA), Japan–Australia Migratory Bird Agreement (JAMBA), Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA) and Bonn Convention)
- biodiversity
- climate
- wetlands of international importance (Ramsar)
- sea dumping (London Protocol).

**Australian Government approvals**

Identify and address requirements for Australian Government approvals required under the EPBC Act and other approvals. These may include but are not limited to:

- approval of the proposed action for each of the applicable controlling provisions under sections 131(1) and 133 of the EPBC Act.

**Queensland legislation**

Relevant Queensland legislation may include, but is not limited to:

- *Aboriginal Cultural Heritage Act 2003* (ACH Act)

- *Alcan Queensland Pty Limited Agreement Act 1965*
- *Building Act 1975*
- *Cape York Peninsula Heritage Act 2007*
- *Coastal Protection and Management Act 1995* (Coastal Act)
- *Commonwealth Aluminium Corporation Limited Agreement Act 1957*
- *Environmental Protection Act 1994* (EP Act)
- *Fire and Rescue Service Act 1990*
- *Fisheries Act 1994*
- *Forestry Act 1959*
- *Greenhouse Gas Storage Act 2009*
- *Land Act 1994*
- *Land Protection (Pest and Stock Route Management) Act 2002*
- *Marine Parks Act 2004*
- *Maritime Safety Queensland Act 2002*
- *Mineral Resources Act 1989*
- *Nature Conservation Act 1992* (NC Act)
- *Pest Management Act 2001*
- *Public Health Act 2005*
- *Queensland Heritage Act 1992*
- *Sustainable Planning Act 2009*
- *State Development and Public Works Organisation Act 1971*
- *Strategic Cropping Land Act 2011* (SCL Act)
- *Transport Infrastructure Act 1994* (TI Act)
- *Transport Operations (Marine Pollution) Act 1995*
- *Transport Operations (Marine Safety) Act 1994*
- *Transport Operations (Road Use Management) Act 1995* (TORUM Act)
- *Transport Planning and Coordination Act 1994*
- *Vegetation Management Act 1999* (VM Act)
- *Waste Reduction and Recycling Act 2011*
- *Water Act 2000*
- *Wild Rivers Act 2005*
- *Work Health and Safety Act 2011*

**Queensland approvals**

Key Queensland approvals required, and to be considered in the EIS process, may include but are not limited to:

- development approval for MCU—undefined use (barge loading terminal, ferry terminal and ancillary activities)—Mapoon Aboriginal Shire Planning Scheme and Cook Shire Council Planning Scheme

- development approval for MCU of a premises for an environmentally relevant activity (ERA)—EP Act:
  - ERA 8: chemical storage
  - ERA 14: electricity generation
  - ERA16: extractive and screening activities (dredging)
  - ERA 43: concrete batching
  - ERA 50: bulk materials handling
  - ERA 56: regulated waste storage
  - ERA 63: sewage treatment
- development approval for tidal works—Coastal Act
- development approval for operational work within a coastal management district, that is:
  - development permit for tidal works—Coastal Act
- development approval for operational work that is the removal, destruction or damage of a marine plant—Fisheries Act
- development approval for operational work that is the constructing or raising of a waterway barrier works—Fisheries Act
- development approval for vegetation clearing—VM Act
- licence or permit for clearing of native plants or interference with a breeding place of a native animal—NC Act
- water licence—Water Act
- interference or take of underground water—Water Resource (Great Artesian Basin) Plan 2006; Great Artesian Basin Resource Operations Plan (February 2007); Water Regulation 2002
- resource entitlements
- environmental authority
- approval to close a road temporarily or permanently—TORUM Act
- allocation notice for quarry material—Water Act
- road impact assessment (including transport impact assessment) and road-use management plan for development on land not contiguous to a state-controlled road—TI Act.

Identify the relevant approval agency for each of the approvals required.

The following approvals may be required if development is located outside the mining lease area:

- resource entitlement would be required for development applications involving State resources
- development approval required for operational works, prescribed tidal works for the barge loading facility, supply barge facility, jetty structure
- development approval required for operational works, tidal works for the transhippers if located in Queensland waters

- development approval required for operational works, tidal works for any permanent moorings for example involving a pile driven into the sea bed
- any approvals required for the upgrade of the airport near Mapoon.

The other potential development triggers under SPA may be:

- development approval for removing or interfering with coastal dunes on land other than State coastal land that is in the erosion prone area above the high water mark
- interfering with quarry material on state coastal land above the high water mark
- development approval for reclaiming land under tidal water.

Please provide a table listing the approvals required for each component of the project and identify the relevant approval agency, jurisdiction and legislation for the approvals required.

### 3.8.2. 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. The key plans and policies are listed under the relevant sections of this TOR. These may include but are not limited to the following:

- Planning Scheme for Mapoon Aboriginal Shire and Cook Shire, administered under SPA.
- environmental protection policies (EPPs, subordinate to the EP Act), including:
  - EPP (Noise) 2008
  - EPP (Air) 2008
  - EPP (Water) 2009
  - EPP (Waste Management) 2000
- state planning policies (SPPs) and their supporting guidelines, may include but are not limited to the following:
  - State Planning Policy 1/92: Development and the Conservation of Agricultural Land (Department of Primary Industries & Department of Housing, Local Government and Planning 1992)
  - State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulphate Soils (Department of Natural Resources and Mines & Department of Local Government and Planning 2002a)
  - State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (Department of Local Government and Planning and Department of Emergency Services 2003a)
  - State Planning Policy 2/07: Protection of Extractive Resources (Department of Mines and Energy 2007a)
  - Temporary SPP 2/11: Planning for stronger, more resilient floodplains (Queensland Reconstruction Authority 2011)

  - Queensland Coastal Plan (Department of Environment and Resource Management 2012b) and *Coastal Hazards Guideline* (Department of Environment and Resource Management 2012a)
  - Draft Coastal Protection State Planning Regulatory Provision: Protecting the coastal environment (Department of State Development, Infrastructure and Planning 2012)
  - Temporary State Planning 2/12: Planning for Prosperity (Department of State Development Infrastructure and Planning 2012)
  - Queensland Government's Environmental Offset Policy (Environmental Protection Agency, 2008)
  - Queensland Biodiversity Offset Policy (Department of Environment and Resource Management, 2011c)
  - Policy for Vegetation Management Offsets version 3, (Department of Environment and Resource Management 2011b)
- fish habitat management operational policies (FHMOPs subordinate to the Fisheries Act), including:
  - FHMOP 001: Management and protection of marine plants and other tidal fish habitats
  - FHMOP 002: Management of declared fish habitat areas
  - FHMOP 004: Dredging, extraction and spoil disposal activities
  - FHMOP 005.2: Marine Fish Habitat Offset Policy (Department of Agriculture, Fisheries and Forestry 2012)
  - FHMOP008: Waterway Barrier Works Development Approvals and associated offsets for impacts on fish movement and fish habitat.
- Queensland Skills Plan (Department of Education, Training and the Arts 2008)
- Queensland Local Industry Policy (LIP) (Department of Employment, Economic Development and Innovation 2010)
- Regional Vegetation Management Code for Western Bioregions, version 2.1 (Department of Natural Resources and Mines 2012).

With specific relevance to maritime safety and operations, the following policies, guidelines and standards may be relevant:

- Maritime Safety Queensland Regulation 2002
- *Maritime Transport and Offshore Facilities Security Act 2003*
- *Transport Operations (Marine Pollution) Act 1995*
- *Transport Operations (Marine Safety) Act 1994*
- Transport Operations (Maritime Safety) Regulation 2004
- Australian Maritime Safety Authority marine orders
- Queensland Coastal Contingency Action Plan (QCCAP)
- Standards for Hydrographic Surveys within Queensland Waters
- Transport Operations (Marine Pollution) Regulation 2008.

The Minister for State Development, Infrastructure and Planning is currently preparing a statutory regional plan for the designated Cape York region: The Cape York Regional Plan. The regional plan will advance the purpose of SPA by providing an integrated planning policy for the region. This regional plan is expected to be in effect in 2013. Due consideration should be given to the project's consistency with this plan (draft or final) when the EIS is being prepared and assessed.

The Queensland Government is undertaking a reform of the planning framework, including the proposed introduction of a 'single SPP'. As this is likely to impact on what SPP and other state planning instruments are in effect, due consideration should be given to this planning framework when the EIS is being prepared and assessed.

### 3.8.3. Environmentally relevant activities

Briefly describe each of the ERAs under the EP Act and associated activities including notifiable activities that are to be carried out in connection with the project. 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. Approvals required for ERA (both within and outside of the proposed mining lease) should be listed and their relevant threshold included.

# 4. Project description

Describe the project through its lifetime of pre-construction, construction, operation and potentially decommissioning. The project description also allows further assessment of which approvals may be required and how they may be managed through the life of the project.

## 4.1. Overview of the 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
- the expected cost, timing, and overall duration of the project, including details of and justification for, any staging of the project.

## 4.2. Location

Describe, using maps at suitable scales and based on latitudes and longitudes using the latest Australian Geodetic Datum, the regional and local context of the project and

all associated infrastructure. Provide real property descriptions of the project. Maps should show the precise location of the project, in particular the:

- location and boundaries of current or proposed land tenures that the project is or will be subject to, and details of the ownership of that land
- location, boundaries, and area and size of the project footprint, including easement widths and access requirements
- location and size of any proposed buffers surrounding the project (for construction and operation)
- location of infrastructure relevant to the project, including but not limited to, the state-controlled road network, local roads and railways, and marine infrastructure
- flood levels in relation to fish passage infrastructure
- location of natural features such as waterways (for example, rivers, streams, creeks, perennial springs other water bodies and wetlands), shorelines, and significant or assessable vegetation including marine plants
- location of any proposed site offices and accommodation sites
- State and Commonwealth marine parks and fish habitat reserve boundaries within or adjacent to the project site.

## 4.3. Construction phase

Provide a detailed staging plan and approximate timeframes for the project's construction activities.

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

Provide the following information on the pre-construction, construction and commissioning of the project, including detailed plans, drawings and maps.

Describe all pre-construction activities, including nature, scale and timing of:

- land acquisitions required, be it in full or as easements, leases
- vegetation clearing including marine plants clearing
- site access
- earthworks
- interference with watercourses and floodplain areas, including wetlands
- waterway barrier works required both within and outside of Mining Leases
- 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.

### 4.3.1. 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.

### 4.3.2. Commissioning

Describe the commissioning process including the associated environmental impacts.

## 4.4. 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.

### Tenements and tenures

Describe and illustrate any existing mining tenements, 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.

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.

### Resource base and mine life

Summarise the results of studies and surveys undertaken to identify the mineral and natural resources required to implement the proposal. Describe the location, volume, tonnage and quality of natural resources (such as land, water, timber and energy). Provide specific details of the following:

- the proposed mine life and an outline of the 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 mineral to be mined annually, including any proposed ramping of production or staging of development.

### Mining methods and equipment

Provide specific details of the following:

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

### Beneficiation Plant

This section should provide a description of the bauxite beneficiation process and the layout of key components of the plant including:

- descriptions of key plant and equipment, processes, capacities and raw materials to be used
- indicative material balances for the processing plant, and the anticipated rates of inputs along with similar data on products and tailings streams
- description of the types, quantities and characteristics of the products produced
- product handling
- the proposed methods and facilities to be used for bauxite storage and for transferring product to ship should be described and shown on plans at an appropriate scale.

### Mine sequencing

Provide specific details of the following:

- the proposed sequence and timing of mining of each seam/ore body within the mining lease
- the physical extent of excavations, location of stockpiles of overburden and/or mineral reject to be handled during the project's operation or left after mining ceases, including the rate of throughput of stockpiles of product, reject and overburden
- typical cross sections of the mine workings showing voids, surface profiles and geological strata
- the proposed progressive backfilling of excavations
- the area disturbed at each major stage of the project.

## 4.5. Associated infrastructure

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 transportation (road/rail/air/ship), water supply and storage, energy supply, telecommunications, stormwater, waste disposal and sewerage,

### 4.5.1. Design of water resources infrastructure

**Water storage infrastructure (the dam wall)**

Describe the process and criteria used to select the preferred design and construction techniques, including:

- full supply level (FSL) and details of any staging or prospects for future expansion
- maximum (final) crest height and spillway height, including height above stream bed
- length and width of crest
- storage capacity, maximum depth, average depth, area of inundation at FSL, dead storage level, area of any buffer required, including a description of the flood margin and means of its determination, length of river bed (and tributaries) inundated
- estimated water yields (with appropriate allowances for environmental requirements)
- general design of outlet works including siting, capacity, off-take level and ability to regulate flows, aquatic fauna exclusion and protection systems
- spillway design, including gate specification, if included
- detail the apron and downstream control point for tailwater
- details of any energy dissipaters at the downstream foot of the barrier
- details any provision for incorporating a fishway or other fish transfer mechanism in the design, should it be required, and its effect on the viability of the proposed project
- details of the physical form of the stream bed within 200 metres of the downstream foot of the barrier
- indicate proposed accessibility to the dam site(s).

**Water distribution infrastructure**

Describe the process and criteria used to select the preferred design and preferred construction techniques, including:

- the method of extracting and/or releasing water from the 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
  - the location and/or frequency of (if applicable) cathodic protection points, off-take valves, pump stations, balance tanks, control valves (isolation points), pigging facilities and any other 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.

**Other infrastructure**

Describe:

- all other 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* (Qld) and self-assessable codes for minor or temporary waterway barrier works in consultation with the Department of Agriculture, Fisheries and Forestry)
- alternative approaches or the opportunity to obtain materials from alternative sources
- management arrangements for the required infrastructure.

### Port facilities

The location and nature of the processes and operations associated with the long term operation of the port should be described including:

- a general description of the operations of the terminal
- the capacity of stockpiling, in loading and out loading operations for each stage of the port's development
- the expected shipping frequency and intensity
- tug operations
- refuelling arrangements
- expected access, navigational and anchorage arrangements
- potential threats from aquatic pests originating from ballast water or other discharges in the Gulf
- concept and layout plans should be provided highlighting the port boundary, proposed structures, plant and equipment associated with port operations. The proposed methods and facilities to be used for loading product to ship should be described and shown on plans at an appropriate scale.

## 4.6. Decommissioning and rehabilitation

This section should present general strategies and methods for decommissioning and rehabilitation of the project when required.

The strategies and methods presented for progressive and final rehabilitation of disturbed areas should demonstrate compliance with the objectives of the Environmental Management Policy for Mining in Queensland (1991), and A Policy Framework to Encourage Progressive Rehabilitation of Large Mines (Department of Environment and Heritage Protection 2004) or with updated versions of that policy available at the time of drafting the EIS. Land suitability assessment should follow the

*Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (Department of Minerals and Energy 1995).

Guidelines on mining are available at:
**www.ehp.qld.gov.au/land/mining/guidelines.html**

The means of decommissioning the project, in terms of the removal of plant, equipment, structures and buildings should be described, and the methods proposed for the stabilisation of the affected areas should be given.

Details are to be provide on rehabilitation strategies, the key performance indicators and how to measure success and how long before success will be demonstrated.

Future land tenure arrangements post-decommissioning of the project should be discussed.

# 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 practicable, minimise environmental harm and maximise environmental benefits of the project.

The objectives of the following subsections 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), Queensland Biodiversity Offset Policy version 1 (Department of Environment and Resource Management 2011c), Draft Coastal Protection State Planning Regulatory Provision, October 2012 and State Planning Policy 4/11: Protecting Wetlands of High

Ecological Significance in Great Barrier Reef Catchments (Department of Environment and Resource Management 2011d).

The mitigation measures and monitoring programs, identified in this section of the EIS, should be used to develop the EMP(s) for the project. For more information, refer to Section 11 (page 67).

## 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). Provide a risk assessment (as part of the requirements of Subsection 8.1 of this TOR) and 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.

Specific storm surge requirements are addressed in Section 8.1 page (63).

### 5.1.1. Flood management

Due to the location of the site, a comprehensive flood study should be included in the EIS that includes:

- quantification of flood impacts 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.
- indicate the size of flood mitigation required to minimise environmental damage due to the construction of the causeway

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

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.

### 5.2.1. Land use and tenure

**Description of environmental values**

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 and rail corridors
- existing land uses and facilities surrounding the project
- distance of the project from residential and recreational areas
- declared water storage catchments
- declared watercourses under the Wild Rivers Act
- location of the project in relation to environmentally sensitive areas.

**Potential impacts and mitigation measures**

Describe the potential changes to existing and potential land uses due to the construction and operation of the project. In particular, describe the following:

- impacts on project site and adjacent land uses and human activities and strategies for mitigation, such as those required by:
  - Temporary State Planning 2/12: Planning for Prosperity (Department of State Development Infrastructure and Planning 2012)
  - State Planning Policy 1/12: Protection of Queensland's Strategic Cropping Land (Department of Environment and Resource Management 2012c)
  - Draft Coastal Protection State Planning Regulatory Provision: Protecting the coastal environment (Department of State Development, Infrastructure and Planning 2012)
  - State Planning Policy 2/07: Protection of Extractive Resources (Department of Mines and Energy 2007a) and *State Planning Policy 2/07 Guideline: Protection of Extractive Resources* (Department of Mines and Energy 2007b), especially with respect to 'key resource areas' defined by that guideline
  - 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
- management of the immediate environs of the project including buffer zones around areas of high conservation, including water courses subject to the Wild Rivers Act
- proposed land use changes in any areas of high conservation value and information on how easement widths and vegetation clearance including marine plants 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.

### 5.2.2. Scenic amenity and lighting

**Description of environmental values**

Describe, in general terms, the existing character of the landscape and the general impression that would be obtained while travelling through and around it. Outline existing landscape features, panoramas and views that have, or could be expected to have, value to the community. Include information such as maps and photographs, particularly where addressing the following issues:

- major views, view sheds, outlooks, and features contributing to the amenity of the area, including assessment from private residences
- focal points, landmarks, waterways and other features contributing to the visual quality of the area and the project site(s)
- character of the local and surrounding areas including vegetation and land use.

Include any relevant World Heritage and National Heritage values of the area.

**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. Explain what measures will be undertaken to avoid or mitigate the identified impacts.

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

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

### 5.2.3. Topography, geology and soils

**Description of environmental values**

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.

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. In locations where the age and type of

geology is such that significant fossil specimens may be uncovered during construction/operations, address the potential for significant finds.

A soil survey of the sites affected by the project must be conducted at a suitable scale, with 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. Provide information on soil stability and suitability for construction of project facilities.

Assess the potential for acid sulfate soils in accordance with:

- Queensland Acid Sulfate Soil Technical Manual (see **www.derm.qld.gov.au/land/ass/products.html**)
- State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils (Department of Natural Resources and Mines & Department of Local Government and Planning 2002a)
- *State Planning Policy 2/02 Guideline: Acid Sulfate Soils* (Department of Natural Resources and Mines & Department of Local Government and Planning 2002b).

Describe, map and illustrate soil types and profiles according to the *Australian Soil and Land Survey Field Handbook* (National Committee on Soil and Terrain 2009), *Guidelines for Surveying Soil and Land Resources* (McKenzie et al. 2008) and *Australian Soil Classification* (Isbell & CSIRO 2002).

Undertake an appraisal of the depth and quality of useable soil. Assess each soil's agricultural land suitability in accordance with:

- *Guidelines for agricultural land evaluation in Queensland* (Department of Primary Industries 1990)

Undertake soil tests and laboratory analyses of representative samples down the soil profile, with 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. Provide geotechnical information on the soils' stability and suitability for construction of project facilities.

Identify any areas of land within the project study area identified as 'strategic cropping land or potential strategic cropping land' (SCL).

Provide a map and description of:

- the location of key tidal planes such as:
  - highest astronomical tide
  - mean high water spring tide
  - mean high water neap tide
  - mean sea level
  - mean low water neap tide
  - mean low water spring tide
  - lowest astronomical tide
- the bathymetry of the project area and surrounds

- relevant coastal geomorphology, characterised and supported by illustrative mapping.

### *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. 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 2004)
- 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
- 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.

Soil profiles should be mapped at a suitable scale and described according to the *Australian soil and land survey field handbook* (National Committee on Soil and Terrain 2009) and *The Australian soil classification* (Isbell & CSIRO 2002). Appraise the depth and quality of useable soil and present information according to the standards required in the *Planning guidelines: The identification of Good Quality Agricultural Land* (Department of Primary Industries & Department of Housing, Local Government and Planning 1993) and State Planning Policy 1/92: Development and the Conservation of Agricultural Land (Department of Primary Industries & Department of Housing, Local Government and Planning 1992).

**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.

Indentify 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:

- the *Soil Erosion and Sediment Control—Engineering Guidelines for Queensland Construction Sites* (Institution of Engineers Australia 1996)
- the *Guideline: EPA Best Practice Urban Stormwater Management—Erosion and Sediment Control* (Environmental Protection Agency 2008a)
- preventing soil loss in order to maintain land capability/suitability
- preventing degradation of local waterways.

Discuss the potential for acid generation from disturbance of acid sulfate soils during earthworks and construction, and propose measures to manage soils and mitigate impacts for all site earthworks and construction activities. Should action criteria be triggered by acid generating potential as a result of testing, provide a site-specific acid sulfate soils management plan prepared in accordance with:

- Queensland Acid Sulfate Soil Technical Manual (see **www.derm.qld.gov.au/land/ass/products.html**)
- State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils (Department of Natural Resources and Mines & Department of Local Government and Planning 2002a)
- *State Planning Policy 2/02 Guideline: Acid Sulfate Soils* (Department of Natural Resources and Mines & Department of Local Government and Planning 2002b).

Identify any areas within the project footprint likely to temporarily or permanently impact SCL and potential SCL. Where areas of identified SCL and potential SCL are likely to be permanently alienated by the project, address the requirements of the SCL Act as they apply to the components of the project, on consultation with the Department of Natural Resources and Mines (DNRM) to discuss undertaking the SCL assessment process defined by the SCL Act.

*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.

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:

- mapping of any areas listed on the Environmental Management Register or Contaminated Land Register under the EP Act
- identification of any potentially contaminated sites not on the registers whether or not remediation is required
- a description of the nature and extent of contamination at each site.

**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 *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (Department of Environment 1998) and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Cwlth).

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. Coastal environment

Describe the existing coastal environment that may be affected by the project in the context of coastal values and environmental values in the Queensland State of the Environment reports, EP Act, environment protection policies, Coastal Act, Coastal Protection and Management Regulation 2003, Draft Coastal Protection State Planning Regulatory Provision (Department of State Development, Infrastructure and Planning, 2012) and State Policy: Coastal Management (Department of Environment and Resource Management 2011e).

Identify actions associated with the project that are assessable development within the coastal zone and will require assessment under the provisions of the Coastal Act and Coastal Protection and Management Regulation 2003.

Assess the projects consistency with SPA and relevant policies of the Draft Coastal Protection State Planning Regulatory Provision (Department of State Development, Infrastructure and Planning 2012).

The Maritime Heritage Section of the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) is responsible for administering the Commonwealth *Historic Shipwrecks Act 1976*.

It is an offence to destroy, damage, cause interference with or dispose of a historic shipwreck or relic, or cause a historic shipwreck or relic to be removed without a permit issued under the Historic Shipwrecks Act. Some historic shipwrecks lie within protected zones with a radius of up to 797 metres. It is an offence to enter a protected zone without a permit. Should any shipwreck or article associated with a shipwreck be discovered, the Historic Shipwrecks Act requires the find to be reported. There are substantial criminal penalties for breaches of the Historic Shipwrecks Act.

It should be noted that the jurisdiction of the Historic Shipwrecks Act is not limited to Commonwealth marine areas, as defined by the EPBC Act, because the Historic Shipwrecks Act has jurisdiction within the coastal waters of the Australian states and territories, extending to the point of lowest astronomical tide.

### 5.3.1. Hydrodynamics and sedimentation

**Description of environmental values**

Assess the physical and chemical characteristics of sediments within the littoral and marine zone adjacent to the project area.

Describe the physical processes of coastal environment related to the project including:

- waves
- currents

- tides
- storm surges
- freshwater flows
- the key influencing factors of cyclones and other severe weather events and their interaction in relation to the assimilation and transport of pollutants entering marine waters from, or adjacent to, the project area.

Describe the environmental values of the coastal resources of the affected area in terms of the physical integrity and morphology of landforms created or modified by coastal processes.

Describe the tidal hydrodynamics of the project area and the adjoining tidal waterways in terms of water levels and current velocities and directions at different tidal states. Two and/or three-dimensional modelling should be undertaken. Provide details of water levels and flows associated with historical and predicted storm surges.

Describe the wave climate in the vicinity of the project area and the adjacent beaches including inter-annual variability and details of historical and predicted extreme wave conditions generated by tropical cyclones or other severe storm events.

Describe the hydrology of the area and the adjacent catchments of the rivers and the associated freshwater flows within the study area and the adjoining tidal waterways in terms of water levels and discharges. Detail the interaction of freshwater flows with different tidal states, including storm tides. Describe inter-annual variability and details of historical and predicted floods including extent, levels and frequency. Flood studies should include a range of annual exceedence probabilities for affected waterways, where data permits.

Predict the likely changes to hydrodynamics (including water levels, currents, wave conditions and freshwater flows) and sedimentation in the project area due to climate change.

**Potential impacts and mitigation measures**

Describe the potential changes to the hydrodynamic processes and local sedimentation resulting from the construction and operation of the project. This should include:

- impacts on tidal flows and water levels
- changes to sediment transport patterns, including the potential of the proposal to impact on bank erosion and/or bed degradation within adjacent waterways
- an assessment of the erosive effects of vessel wash associated with boat traffic generated by the proposal. This would be supported by a vessel traffic impact assessment to determine the increase of vessels (size and number) that can be expected as a result of the project relative to the existing situation.

This assessment should also discuss the potential impacts associated with extreme events such as storm tide flooding. This must include an assessment of the vulnerability of the project to storm tide flooding and the potential of the project to affect vulnerability to storm tide flooding on adjacent properties.

When assessing the hydrodynamics of the area and movement of sediment along the coast, consider coastal processes such as erosion and accretion at adjacent locations.

### 5.3.2. Water quality

**Description of environmental values**

Provide baseline information on water quality of coastal waters. This information should include (but is not necessarily be limited to) general physical chemical water quality parameters such as dissolved oxygen, pH, heavy metals, nutrients, temperature, salinity, oil in water and turbidity. For coastal areas potentially affected by sediment run-off or dredging, suspended solids concentration, benthic sedimentation rates, Secchi depth and surface and benthic PAR (photosynthetically active radiation) levels should also be included. Discuss the interaction of freshwater flows with coastal waters and the significance of this in relation to marine flora and fauna adjacent to the project area.

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

- variability associated with the local wind climate, seasonal factors, freshwater flows and extreme events
- values identified in the EPP (Water) 2009.

**Potential impacts and mitigation measures**

- Define and describe the water quality objectives and practical measures for protecting, mitigating or enhancing coastal environmental values. This includes how nominated quantitative standards and indicators may be achieved, and how the achievement of the water quality objectives will be monitored, audited and managed. The potential environmental harm caused by the project on coastal resources and processes shall be described in the context of controlling such effects. State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils (Department of Natural Resources and Mines & Department of Local Government and Planning 2002) should be addressed as should the *State Coastal Management Plan* (Environmental Protection Agency 2001).

Specific issues to be addressed include:

- the water quality objectives used (including how they were developed), and how predicted activities will meet these objectives—refer to:
  - *Queensland Water Quality Guidelines 2009* (Department of Environment and Resource Management 2009c)
  - *The Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand 2000)
- potential threats to the water quality and sediment quality of the coastal environment within the project footprint, specifically associated with constructing and operating the facilities.

This assessment shall consider, at minimum:

- dredging and dredge material disposal, including disturbance of fine-grained sediments and contaminated material
- potential accidental discharges of contaminants during construction and operation of the marine precinct
- release of contaminants from marine structures and vessels, including potential for introducing marine pests
- stormwater run-off from the marine precinct facilities and associated infrastructure
- flooding of relevant river systems and other extreme events.

Describe strategies for protecting Ramsar wetlands; and discuss any obligations imposed by state or Commonwealth legislation or policy, or international treaty obligations (that is, JAMBA, CAMBA and ROKAMBA).

### 5.3.3. Sediment quality and dredging

Provide baseline information on marine sediments and sediment quality in the area likely to be disturbed by dredging or vessel movements including contaminants (such as heavy metals, nutrients and pesticides), the presence of fines and/or indurated layers and acid sulfate potential. Present this information as a map of sediment types based on their physical and chemical properties and include depth profiles. In addition a sampling analysis plan (SAP) shall be developed and implemented to determine if the proposed activity has a significant impact and therefore if assessment under the *Environmental Protection Biodiversity and Conservation Act 1999* is required.

Assessment of the characteristics of the material and potential impacts at the disposal site are to be undertaken in accordance with the National Assessment Guidelines for Dredging (Commonwealth of Australia 2009).

Detail specific measures to maintain sediment quality to nominated quantitative standards within the project and surrounding areas, particularly where future maintenance dredging may be required.

Comment on the choice of the disposal site in relation to coastal management outcomes, having regard to the nature of the spoil, cost of alternatives and potential impacts on coastal resources and their values.

Describe provisions for dredge material disposal and associated impacts on sediment quality. Discuss disposal options for contaminated material, if required. This must include a description of the arrangements to be put in place for long-term (20 years) dredge material disposal including details of proposed material placement areas.

## 5.4. Nature conservation

Detail the existing nature conservation values, including those of the Steve Irwin Wildlife Reserve Nature Refuge, which may be affected by the project. Describe the environmental values in terms of:

- integrity of ecological processes including connectivity, refugial areas, critical habitats and areas of remoteness and naturalness
- conservation of resources

- biological diversity, including habitat of EVNT. Regional biodiversity habitats of significance (such as those listed in the Cape York Peninsula Biodiversity Planning Assessment) should be referenced
- 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 flora and fauna populations. Field surveys should be based on the guidelines listed below for their survey approach and methodologies:

- *Guidelines for Flora Survey and Assessment in Northern Queensland* (available from Environmental Services, Department of Environment and Heritage Protection Cairns)
- Terrestrial Vertebrate Fauna Survey Guidelines which are available at http://www.ehp.qld.gov.au/ecosystems/biodiversity/fauna-survey.html.

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

Consider all relevant publicly available information from the region including surveys and reports relating to the Steve Irwin Wildlife Reserve Nature Refuge.

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.

### 5.4.1. 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, high preservation areas 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 Speartooth Shark and Sawfish species and species listed under the NC Act
- regional ecosystems (REs) listed as 'endangered' or 'of concern' under state legislation
- good representative examples of remnant Res  or endangered or of-concern Res that are described as having 'medium'  'low' or 'no' representation in the protected

area estate as defined in the Regional Ecosystem Description Database (REDD) available at **www.ehp.qld.gov.au**

- sites containing near-threatened or bio-regionally significant species or essential, viable habitat for near-threatened. Species that are identified as being bio-regionally significant, or essential viable habitat for species of bio-regional significance, should be referenced (i.e. those identified as being of State or regional significance in the Cape York Peninsula Biodiversity Planning Assessment).
- 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 adjacent to nesting beaches, feeding, resting or calving areas (for example, marine turtles, dugongs and cetaceans)
- 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
  - coral reefs
  - riparian vegetation
  - important buffer to a protected area or important habitat corridor between areas
- declared fish habitat areas and sites containing protected marine plants under the Fisheries Act
- sites of palaeontologic significance such as fossil sites
- sites of geomorphological significance
- areas of environmental significance as defined by the *Queensland Coastal Plan* (Department of Environment and Resource Management 2012b)
- protected areas that have been proclaimed under the NC Act and Marine Parks Act, or are under consideration for proclamation
- 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 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 the marine environment and 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, including sharks and rays, 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 of the project area 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 (CAMBA), Japan–Australia Migratory Bird Agreement (JAMBA), Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)).

Provide details about the approvals that will be required under the NC Act and the VM Act for development made assessable under SPA. The EMP for 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**).

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)

- Marine Fish Habitat Offset Policy (FHMOP 005.2) (Department of Agriculture, Fisheries and Forestry 2012)
- Offsets for Net Gain of Koala Habitat in South East Queensland Policy (Department of Environment and Resource Management 2010)
- areas of environmental significance as defined by the Draft Coastal Protection State Planning Regulatory Provision (October 2012) (Department of State Development, Infrastructure and Planning 2012) and associated maps
- Areas identified as significant in the *Cape York Peninsula Biodiversity Planning Assessment.*

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

### 5.4.2. Terrestrial flora

**Description of environmental values**

Provide vegetation mapping for all relevant project sites, and for adjacent areas to illustrate interconnectivity. Mapping should also illustrate any larger scale interconnections between areas of remnant or regrowth vegetation where the project site includes a corridor connecting those other areas. Discuss any variances between site mapping and mapping produced by the Queensland Herbarium.

Describe the vegetation communities within the affected areas at an appropriate scale (maximum 1:10 000), according to *Guidelines for Flora Survey & Assessment in Northern Queensland* which is available from Environmental Services, EHP in Cairns showing the following:

- location and extent of vegetation types using the regional ecosystem type descriptions in accordance with the REDD
- location of vegetation types of conservation significance based on regional ecosystem 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
- the location of any horticultural crops in the vicinity of the project area
- location and abundance of any known exotic or weed species.

Highlight sensitive or important vegetation types, including the Coolibah Springs complex, including any marine littoral and subtidal zone and 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, allowing for seasonal factors, 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
- any plant species of conservation significance according to Cape York Peninsula Biodiversity Planning Assessment
- any plant species of 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
- the methodology in *Biocondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland: Assessment Manual* (version 2.1) (Eyre et al. 2011) and *Ecological Equivalence Methodology Guidelines* (version 1) (Department of Environment and Resource Management 2011a) for sites possibly requiring offset considerations under the relevant policies that may include Policy for Vegetation Management Offsets (version 3) (Department of Environment and Resource Management 2011b) or Queensland Biodiversity Offset Policy (version 1) (Department of Environment and Resource Management 2011c).

Existing information on plant species may be used instead of new survey work, provided that the data is derived from previous surveys at the project site consistent with the above methodology and that survey work for endangered, vulnerable and near threatened protected plants was carried out across a spectrum of seasonal conditions. The methodology used for flora surveys should be specified in the appendices to the report.

**Potential impacts and mitigation measures**

Describe the potential environmental impacts to the ecological values of the project 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 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 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
- a description of any foreseen impacts which increase the susceptibility of ecological communities and species to the impacts of climate change
- the impact on endangered, vulnerable and near threatened plants resulting from the development and the impacts on the species viability in the wild needs to be accurately assessed and mitigated.

Outline how these measures will be implemented in the EMP for the project. Weed management strategies are required for containing existing weed species (for example, parthenium and other declared plants) and ensuring no new declared plants are introduced to the area. Refer to the local government authority's pest management plan and any strategies and plans recommended for the project area by Biosecurity Queensland. Discuss the strategies in accordance with provisions of the Land Protection (Pest and Stock Route Management) Act in the main body of the EIS and in the pest management plan within the EMP for the project.

### 5.4.3. 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
- probable or actual existence of any species and communities of conservation significance in the study area (species listed under *Nature Conservation Act 1992* or in the Cape York Peninsula Biodiversity Planning Assessment), 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). Probable or actual existence of any species or communities of regional conservation significance (indentified in the Cape York Peninsula Biodiversity Planning Assessment) are to be referenced.

- 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.

Present fauna data in columns titled: Number, collector, Start date, End date, Location, Latitude, Longitude, Zone, Easting, Northing, Datum, Precision (m), Altitude (m), Vegetation code, Slope, Aspect, Scientific name, Common name, Count, count type, Age code, Sex code, Breeding code, Identification method, Collector code, Specimen registration, Specimen location, Collection notes, vetting code.

The Department of Environment and Heritage Protection (DEHP) has supporting documents available which explain the above fields and codes.

The Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland (Department of Science, Information Technology, Innovation and the Arts, 2012) are available on the website at:
**http://www.ehp.qld.gov.au/ecosystems/biodiversity/fauna-survey.html**

It is essential for this location that fauna surveys are carried out across a range of seasonal conditions to provide information on the presence of endangered, vulnerable and near threatened fauna species

Identify any species listed by the NC Act occurring in the project area. Identify any species listed by the 'Back on Track' species prioritisation methodology (refer to: **www.ehp.qld.gov.au/wildlife/prioritisation-framework/index.html**).

Indicate how well any affected communities are represented and protected elsewhere in the bio-region where the project occurs.

Provide relevant site data to 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**).

**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
- The overall wider impact on the long-term viability of EVNT fauna species in the wild

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 in the EMP for the project.

Address feral animal management strategies and practices. The study should develop strategies to ensure that the project does not contribute to increased encroachment of a feral animal species. Refer to the local government authority's pest management plan and any strategies and plans recommended for the project area by Biosecurity Queensland. Discuss the strategies in accordance with the provisions of the Land Protection (Pest and Stock Route Management) Act in the main body of the EIS and in the pest management plan within the EMP for the project.

### 5.4.4. Aquatic biology and ecology

**Description of environmental values**

Describe the aquatic flora and fauna (freshwater, estuarine and marine) present, or likely to be present, in the areas affected by the project, including the Coolibah Springs complex. Include:

- fish species (including sharks (including the Spear-tooth Shark), rays and Freshwater Sawfish including dwarf sawfish and Queensland groper) mammals (including indo-pacific dolphins and the snubfin dolphins at Port Musgrave), reptiles, amphibians, crustaceans and aquatic flora and invertebrates occurring in the waterways within the affected area and any associated wetlands and marine plants (as defined under section 5 of the Fisheries Act and Queensland Wetland Mapping)
- any rare or threatened aquatic and marine species
- exotic and pest (freshwater and marine flora and fauna), marine 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 substrate
- habitat downstream of the project or potentially impacted due to currents in associated lacustrine and marine environments
- stream type, including extent of tidal influence and common levels such as highest and lowest astronomical tide and mean high water springs and low water spring tide
- description of aquatic communities up and downstream of the study area
- reef habitat and coral species

- any other state significant biodiversity values identified in the Queensland Biodiversity Offset Policy (version 1) (Department of Environment and Resource Management 2011c) that are not described elsewhere.

Describe any wetlands listed by the Department of Environment and Heritage Protection (DEHP) as areas of national, state or regional significance and detail their values and importance for aquatic flora and fauna species.

### *Flora*

Define the nature and extent of existing marine features such as streams and rivers, palustrine and lacustrine wetlands, littoral and sub-littoral lands, waterways, affected tidal and subtidal lands, corals and marine vegetation (e.g. saltmarsh plants, salt couch, seagrass and mangroves) within the proposed area of development and in the areas adjacent to the project.

Conduct field assessments for plant species, preferably in both pre- and post-wet season conditions, as follows:

- record site data in a form compatible with the Queensland Herbarium CORVEG database
- record a complete list of species present at each site, including those species defined and protected under the Fisheries Act
- record the relative abundance, density, height, area, health of any marine plants within and adjacent to the study area of plant species present
- identify any plant species of conservation, cultural, commercial or recreational significance
- submit specimens of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994 (other than common species) to the Queensland Herbarium for identification and entry into the HERBRECS database.

### *Fish habitat*

Describe the nature and extent of fish habitat (freshwater, estuarine and marine) that have the potential to be impacted, including seagrass (permanent and ephemeral), macro-algae, mangrove, saltmash and, if any, tidal melaleuca communities and saltcouch communities and sand bars/mudflats, mapped relative to existing features for reference.

Surveys for seagrass and algae and mangroves should reflect the seasonal variation in occurrence and density of these communities. The location and density of marine plants should be mapped at an appropriate scale.

Show the location of any declared Fish Habitat Areas proximal to the proposed dredging site and marine infrastructure for transportation of fill.

Details of the aquatic fauna sampling methods, sites dates and times of sampling and flow conditions and water quality at the time(s) of sampling.

### *Fauna—turtles*

Describe the turtle species that may use beaches near the proposed development area. The proponent should monitor turtle nesting along beaches near the proposed project area for the duration of the turtle nesting seasons, for turtle species occurring in the area.

Undertake a desktop review of information on the turtle communities of the study area, particularly the green, hawksbill, loggerhead, olive ridley and flatback turtles, paying specific attention to any anecdotal or recorded information on turtle populations frequenting the port area and any known nesting sites.

Refer to studies of the turtle populations and consult the Department of National Parks, Recreation, Sport and Racing on historical data for the area, particularly on previously conducted nesting surveys.

Use this information to develop recommendations on the most appropriate management measures to be adopted to minimise the risk of turtle injury or death. Particular reference should be given to protecting turtles from boat strike.

### *Benthic macro invertebrates*

Benthic macro invertebrate communities likely to be directly or indirectly impacted by the project should be characterised for the assessment of the potential impacts of proposed capital works. Consider the effect of ongoing maintenance activities, including dredging, on benthic fauna.

### Potential impacts and mitigation measures

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

- potential impacts to flora and fauna communities, including threatened marine fauna and marine plants, from dredging works and dredge spoil disposal, and transporting marine fill to the project site. This should include modelling of the potential impacts of the dredge plume (for example, increased turbidity) on seagrass and other aquatic species.
- potential impacts due to alterations to the long-term hydrodynamic processes of the coastal environments, with specific reference to impacts on riparian vegetation and other sensitive vegetation communities, including mangrove stands and seagrass meadows
- 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

- offsets proposed for unavoidable, permanent loss of fisheries habitat
- methods to minimise the potential for introducing or spreading weed species or plant disease
- monitoring aquatic biology health, productivity and biodiversity in areas subject to direct discharge
- measures to be implemented to avoid or minimise ship and barge strike and propeller strike during construction, commissioning and operation of the project
- potential impacts from climate change and the project's potential to increase the susceptibility of aquatic ecological communities and species, for example, coral bleaching.

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 measures will be implemented in the overall EMP for the project.

Provide details of the management methods which would avoid or minimise impacts on birds, marine mammals, turtles and fish, including migrations and marine plant propagation. In particular, present a discussion of 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, including, but not restricted to direct references to all relevant turtle species included in the *Recovery Plan for Marine Turtles in Australia* (Commonwealth of Australia 2003).

Outline how these measures will be implemented in the EMP for the project.

## 5.5. Water resources

### 5.5.1. Description of environmental values

Describe the quality and quantity of water resources (in particular the Wenlock River, Ling Creek and the Coolibah Springs) in the vicinity of the project, including:

- existing surface and groundwater in terms of physical, chemical and biological characteristics
- existing surface drainage patterns, flows, history of flooding including extent, levels and frequency and present water uses
- baseline details on water assets, including environments supported by those assets
- a site water balance for each asset, complemented by a regional water balance
- an assessment of 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 surface water and identified aquifer(s)
  - an assessment of regional water 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.

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

- Environmental Protection (Water) Policy 2009 (EPP (Water))
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand 2000)
- *Queensland Water Quality Guidelines 2009* (Department of Environment and Resource Management 2009a)
- physical integrity, fluvial processes and morphology, including riparian zone vegetation and form, if relevant
- any impoundments (for example, dams, levees, weirs)
- hydrology of waterways and groundwater
- sustainability, including both quality and quantity
- dependent ecosystems
- existing and other potential surface and groundwater users
- water resource plans relevant to the affected catchments.

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)
- interaction with surface 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).

The groundwater assessment should also be consistent with relevant guidelines for the assessment of acid sulfate soils, including spatial and temporal monitoring, to accurately characterise baseline groundwater characteristics.

**Groundwater**

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
- draw down 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.

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.

### 5.5.2. Potential impacts and mitigation measures

Assess the project's potential impacts on water resource (in particular the Wenlock River, Ling Creek and the Coolibah Springs) environmental values identified in the previous section. Define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of objectives will be monitored, audited and managed. Include the following:

- potential impacts on the flow and the quality of surface and groundwater from all phases of the project, with reference to their suitability for the current and potential downstream uses and discharge licences
- an assessment of all likely impacts on groundwater depletion or recharge regimes
- potential impacts of surface water flow on existing infrastructure, with reference to the EPP (Water) and the Water Act
- chemical and physical properties of any wastewater (including stormwater at the point of discharge into natural surface waters), and the toxicity of effluent to flora and fauna
- potential impacts on other downstream receiving environments, if it is proposed to discharge water to a riverine system
- the results of a risk assessment for uncontrolled releases to water due to system or catastrophic failure, implications of such emissions for human health and natural ecosystems, and strategies to prevent, minimise and contain impacts
- an assessment of the potential to contaminate surface and groundwater resources and measures to prevent, mitigate and remediate such contamination
- details of a monitoring program for the groundwater resources, using existing deep bores, to establish the base line yield and water quality of the supply from those bores.

Strategies should be adequately detailed to demonstrate best practice management and that environmental values of receiving waters will be maintained to nominated water quality objectives. Describe the monitoring programs that will assess the effectiveness of management strategies for protecting water resources during the construction, operation and decommissioning of the project. Outline how these strategies are incorporated into appropriate sections of the EMP.

### Surface water and water courses

Assess the hydrological impacts of the proposal on surface water and water courses, particularly with 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.

Discuss the need or otherwise for licensing of any dams (including referable dams) or creek diversions, under the Water Act, *Water Supply Act 2008* and the Sustainable Planning Regulation 2009. Water allocation and water sources, including impacts on existing water entitlements, including water harvesting, should be established in consultation with DNRM.

### Wastewater treatment

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

In relation to water supply and usage, and wastewater disposal, discuss anticipated flows of water to and from the project area. Where dams, weirs or ponds are proposed, investigate the effects of predictable climatic extremes (storm events, floods and droughts) on:

- the capacity of the water storages (dams, weirs, ponds) and the ability of these storages to retain contaminants
- the structural integrity of the containing walls
- relevant operating regime
- the quality of water contained
- flows and quality of water discharged.

The design of all water storage facilities should follow the technical guidelines on site water management.

Discuss the mitigation options and the effectiveness of mitigation measures, with particular reference to sediment, acidity, salinity and other emissions of a hazardous or toxic nature to human health, flora or fauna.

### Groundwater

Include an assessment of the potential environmental impact caused by the project (and its associated project components) to local groundwater resources, including the potential for groundwater-induced salinity.

Describe the response of the groundwater resource to the progression and finally cessation of the proposal.

Assess the impact of the project on the local groundwater regime caused by the altered porosity and permeability of any land disturbance.

Assess and describe any potential for the project to impact on groundwater-dependent vegetation; describe avoidance and mitigation measures.

## 5.6. Air quality

### 5.6.1. Description of environmental values

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)).

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.

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 impact assessment.

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

### 5.6.2. Potential impacts and mitigation measures

Consider the following air quality issues and their mitigation:

- an inventory of air emissions from the project expected during construction and operational activities (including source, nature and levels of emissions)
- '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 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 site that includes the environmental values identified by the EPP (Air), including any sites that could be sensitive to the effects of predicted emissions
- dust and odour generation from construction activities, especially in areas where construction activities are adjacent to existing road networks or are in close proximity to sensitive receivers
- climatic patterns that could affect dust generation and movement
- vehicle emissions and dust generation along major haulage routes both internal and external to the project site

- human health risk associated with emissions from project activities of all hazardous or toxic pollutants
- impacts on terrestrial flora and fauna.

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 (Cwlth) and the EPP (Air) air quality objectives. If an air quality parameter is not addressed in these legislative instruments, discuss the air quality impact with reference to its risk to human health, including appropriate health-based guidelines/standards.

## 5.7. Greenhouse gas emissions

### 5.7.1. Description of environmental situation

Provide an inventory of projected annual emissions for each relevant greenhouse gas, with total emissions expressed in '$CO_2$ 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 2010c) 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 and impoundment.

### 5.7.2. 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.

## 5.8. Noise and vibration

### 5.8.1. 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 as applicable:

- *Noise Measurement Manual* (Environment Protection Agency 2000)
- *Guideline: Noise and vibration from blasting* (Environmental Protection Agency 2006)
- *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)
- EP Act
- *Environment Protection and other Legislation Amendment Act (No. 2) 2008* (Qld)
- *Ecoaccess Guideline (Draft) Assessment of Low Frequency Noise* (Environmental Protection Agency 2004)
- *Road traffic noise management: code of practice* (Department of Main Roads, 2008)
- *Queensland Rail Code of Practice for Railway Noise management, Interest in Planning Schemes No 3* (Queensland Transport 2007).

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. Both the background noise measurements and the noise prediction should take into consideration the seasonal variations.

### 5.8.2. Potential impacts and mitigation measures

Describe the impacts of noise and vibration generated during the pre-construction, construction, operational and decommissioning 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 modelling (such as Environmental Noise Model or SoundPLAN) where appropriate
- 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 5.8.1
- impact on terrestrial, avian and aquatic fauna including at aggregation sites, such as water bodies, nesting and roosting sites, with special reference to endangered species or migration pathways.
- 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)

- consideration of any seasonal variations

Information should be supplied on blasting which might cause ground vibration or fly rock on, or adjacent to, the site with particular attention given to places of work, residence, recreation, worship and general amenity. The magnitude, duration and frequency of any vibration should be discussed.

**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.

## 5.9. Waste

### 5.9.1. Waste generation

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

### 5.9.2. 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

(e.g. 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.

- Air emissions—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 (e.g. 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 5.6 (page 46).
- Excavated waste—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.
- Tailings—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.
- Regulated waste—how regulated waste will be managed and what licensed facility it will be taken to. Discuss disposal options and methodology with consideration of the waste hierarchy.

The EIS may need to consider the following effects:

- groundwater from excavations
- rainfall directly on to disturbed surface areas

- run-off from roads, plant and industrial areas, chemical storage areas
- drainage (that is, run-off plus any seepage or leakage)
- seepage from other waste storages
- water usage for:
  - process use
  - dust suppression
  - domestic purposes
- evaporation
- domestic sewage treatment—disposal of liquid effluent and sludge
- water supply treatment plant—disposal of wastes.

## 5.10. Transport

Present the transport assessment for each project-affected mode (road, rail, air and sea) as appropriate for each phase of the project. These assessment reports should provide sufficient information to allow an independent assessment of how existing transport infrastructure will be affected by project transport at the local and regional level.

### 5.10.1. Existing infrastructure

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

### 5.10.2. Transport activities and routes

For each mode of transport and each phase of the project, provide traffic generation information and proposed solutions to mitigate the effects 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, origin and destination of project inputs and outputs of transported raw or refined materials, plant, construction materials and operational equipment, waste, hazardous goods and finished products for all phases of the project
- identified how and if project inputs and outputs including raw or refined materials, plant, construction materials and operational equipment, waste, hazardous goods and finished products will be moved through the local and regional transport network (including number and type of vehicles, mode, volume, composition, trip timing and routes)

- identify proposed solutions to mitigate the effects of development including road works, noise and amelioration measures
- traffic generated by workforce personnel including visitors (volume, composition, timing and routes)
- likely heavy, oversize and indivisible loads (volume, composition, timing and routes) highlighting any vulnerable bridges and structures along proposed routes.

Describe:

- access locations (existing and proposed) to state-controlled roads
- locations of proposed road-crossing points of existing and proposed rail infrastructure associated with the project.

### 5.10.3. Potential impacts and mitigation measures

Include details of the adopted assessment methodology (for impacts on roads: the road impact assessment report in accordance with the *Guidelines for Assessment of Road Impacts of Development*) (Department of Main Roads 2006). Assessment of traffic impacts is to include the transport arrangements for permanent and temporary workforce associated with all phases of the project.

Assess project impacts on:

- local and state-controlled road networks, including key road and road/rail intersections, at project construction, operation and decommissioning stages. Any impact to level crossings should be assessed using the Australian Level Crossing Assessment Model (ALCAM)
- capacity, safety, local amenity, efficiency and condition of transport operations, services and assets from either transport or project operations, including an assessment of pavement life of the road network as a result of the project. Refer, where relevant, to the *Queensland Road Safety Action Plan 2010–2011* (Department of Transport and Main Roads 2010)
- possible interruptions to transport operations
- the natural environment within the jurisdiction of an affected transport authority (for example, road and rail corridors)
- the nature and likelihood of product-spill to both land and marine environments during transport, if relevant
- driver fatigue for workers travelling to and from regional centres and key destinations
- any existing or proposed strategies for public passenger transport and active transport and address, where relevant, requirements of Part 2A of the Transport Planning and Coordination Act
- access to transport for people with a disability
- transport and handling of hazardous substances and dangerous goods
- the cumulative impact of this project adding to the impact of other known proposed or current major projects impacting on the road network.

### 5.10.4. Infrastructure alterations

Detail:

- any proposed alterations or new transport-related infrastructure and services required by the project (as distinct from impact mitigation works)
- construction of any project-related plant and utilities, within or impacting on the jurisdiction of any transport authority.

### 5.10.5. Transport impact management strategies

Discuss and recommend how identified impacts will be mitigated so as to maintain safety, efficiency and condition of each mode. These mitigation strategies are to be prepared in close consultation with 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.

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

#### Road/rail management planning

Outline:

- procedures for assessing and agreeing on the scope of required mitigation works with road/rail corridor managers (for example, maintenance or upgrades), including any associated works, such as sourcing water and gravel
- strategies to minimise the effects of project transport on existing and future public road or rail corridors
- steps to be taken to prevent access from public roads/rail corridors to the project sites
- strategies to maintain safe access to public road/rail reserves to allow road/rail/pipeline maintenance activities
- process for decommissioning any temporary access to road/rail 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. Conditions of approval for transport management impacts should also be detailed in the EMP.

#### Shipping management planning

Develop management plans in accordance with the *Maritime Safety Queensland Guidelines for Major Development Proposals* (Department of Transport and Main Roads 2010) or other relevant guidelines as applicable.

Consult the Regional Harbour Master on maritime issues relating to moving and loading tankers and any barge operations (for example, dredging). Discuss the results of the consultation in the EIS.

Describe current vessels using the port and in the Commonwealth Marine Area, their size, shipping movements, anchorages, access to/from the port and navigational arrangements.

In regard to increased shipping volumes, address the following:

- potential for introduction of exotic organisms from increased shipping rates
- ballast water management arrangements—including Australian Quarantine and Inspection Service mandatory arrangements and agency contingency planning
- management of ship waste, in particular quarantine waste, domestic garbage, oil and sewage
- risk of spills and their management
- potential foreshore damage caused by tanker and tug activities
- potential for increased vessel strike to marine species
- potential impacts on existing shipping activity
- routes of ships in transit through port waters and the aligned infrastructure such as navigational aids.

Additional marine transport issues that should be considered include the potential of the proposal to impact on recreational craft.

**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, proposed aviation upgrades and safety improvements needed to support the projected level of air services.

## 5.11. Indigenous cultural heritage

### 5.11.1. Description of existing Indigenous cultural heritage values

Describe the existing Indigenous cultural heritage values that may be affected by the project and the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms.

Subject to any confidentiality requirements of the relevant Indigenous parties, explain the significance of artefacts, items or places of Indigenous cultural heritage value likely to be affected by the project at a local, regional, state and national level.

Also describe how, in conjunction with the appropriate Indigenous people, subject to confidentiality requirements, the cultural heritage values were ascertained. This could include:

- the results of any Aboriginal cultural heritage survey undertaken
- the DATSIMA Aboriginal Cultural Heritage Register and Database
- any existing literature relating to Indigenous cultural heritage in the project area.

### 5.11.2. Potential impacts and mitigation measures

To the greatest extent practicable, significant cultural heritage areas should be avoided by the project.

Provide an assessment of likely effects on sites of Indigenous cultural heritage values.

Define and describe the objectives and practical measures for protecting or enhancing Indigenous cultural heritage environmental values. Describe how nominated quantitative standards and indicators may be achieved for cultural heritage management, and describe how the achievement of the objectives will be monitored, assessed and managed.

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

**Native title agreement or cultural heritage management plan**

During the EIS process, the proponent should initiate a native title agreement (NT agreement), as defined under the ACH Act, which includes management and protection strategies for Indigenous cultural heritage or a Cultural Heritage Management Plan (CHMP) under the ACH Act. An NT agreement or 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. In developing the CHMP, the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) should be consulted.

An NT agreement or CHMP should be negotiated between the proponent and the appropriate native title/Indigenous parties and should include the following:

- a process for including Indigenous people associated with the development areas in protecting and managing Indigenous cultural heritage
- processes for mitigating, managing and protecting identified cultural heritage sites and objects in the project areas, including associated infrastructure developments, during both the construction and operational phases of the project
- provisions for managing the accidental discovery of cultural material, including burials
- a clear recording process to assist initial management and recording of accidental discoveries
- a cultural heritage induction for project staff
- developing a cultural heritage awareness program to be incorporated into the contractor/employee manual and induction manual. This is to be in the form of a plain language, short document that is easy for contractors and staff ‘on the ground’ to understand
- a conflict resolution process.

If an NT agreement is not finalised or a CHMP has not been approved when the EIS is submitted to the Coordinator-General, the following must be provided (subject to confidentiality):

- an outline of the draft CHMP or draft plan within the NT agreement that addresses management and protection strategies for cultural heritage, subject to any confidentiality provisions, outlining the position of the relevant parties
- details of the proposed steps and timeframes for finalising the CHMP or NT agreement.

### 5.11.3. 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.

## 5.12. Non-Indigenous cultural heritage

### 5.12.1. Description of existing non-Indigenous cultural heritage values

Include a cultural heritage study/survey that describes non-Indigenous cultural heritage sites and places, and their values.

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

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

- 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
- a constraints analysis of the proposed development area to identify and record non-Indigenous cultural heritage places.

### 5.12.2. Potential impacts and mitigation measures

Provide an assessment of any likely effects on 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 and management of impacts

## 6.1. Description of existing social values

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

### 6.1.1. Social and cultural area

Define the project's social and cultural area of influence, including the local, district, regional and state level as relevant, taking into account the:

- potential for social and cultural impacts to occur
- location of other relevant proposals or projects
- location and types of physical and social infrastructure, settlement and land use patterns
- social values that might be affected by the project (for example, integrity of social conditions, visual amenity and liveability, social harmony, public health and wellbeing, and sense of community)
- Indigenous social and cultural characteristics such as native title rights and interests, and cultural heritage.

### 6.1.2. Community engagement

Consistent with national and international good practice, and with regard to local and regional strategies for community engagement, the proponent should undertake a community engagement strategy to engage at the earliest practicable stage with likely affected parties to discuss and explain the project, and to identify and respond to issues and concerns regarding social impacts.

Detail the community engagement processes used to conduct open and transparent dialogue with stakeholders. Such processes should include, but not be limited to, community reference group forums. Include the project's planning and design stages and future operations including affected local and state authorities. Engagement processes should consider social and cultural factors, customs and values, and, where relevant, linkages between environmental, economic, and social impact issues.

Discuss engagement strategies and processes, including how complaint resolution will be addressed, for all stages of the project.

### 6.1.3. Social baseline study

Undertake a targeted baseline study of the people residing in the project's social and cultural area, to identify the project's social issues, potential adverse and positive social

impacts, and strategies and measures developed to address the impacts. The social baseline study should be based on qualitative, quantitative, and participatory methods. It should be supplemented by community engagement processes, and reference relevant data contained in local and state government publications, reports, plans, guidelines and documentation, including regional plans and, where available, community plans.

Describe and analyse a range of demographic and social statistics determined relevant to the project's social and cultural area including:

- major population trends and changes occurring irrespective of the project
- total population (the total enumerated population for the social and cultural area and the full-time equivalent transient population), 18 years and older
- estimates of population growth and population forecasts resulting from the proposal
- family structures
- age and gender distributions
- education, including schooling levels
- health and wellbeing measures
- cultural and ethnic characteristics
- the Indigenous population including age and gender
- income including personal and household
- labour force by occupation and industry
- housing costs—monthly housing repayments (per cent of dwellings in each category) and weekly rent (per cent of dwellings in each category), housing tenure type and landlord type, household and family type
- housing availability and affordability: the rental market (size, vacancy rate, seasonal variations, weekly rent by percentage dwellings in each category); the availability and typical costs of housing for purchase, monthly housing repayments by percentage dwellings in each category; and the availability of social housing
- disability prevalence
- the social and economic index for areas, index of disadvantage—score and relative ranking
- crime, including domestic violence
- any other indicators determined through the community engagement process as relevant.

The social baseline study should take account of current social issues such as:

- the social infrastructure, including community and civic facilities, services and networks—for definition see *South East Queensland Regional Plan 2009–2031* (Department of Infrastructure and Planning 2009)
- settlement patterns including the names, locations, size, history and cultural aspects of settlement in the social and cultural area
- the identity, values, lifestyles, vitality, characteristics and aspirations of communities in the social and cultural area, including Indigenous communities

- land use and land ownership patterns including:
  - rural properties, farms, croplands and grazing areas including on-farm activities near the proposed activities
  - the number of properties directly affected by the project
  - the number of families directly and indirectly affected by the project including Indigenous traditional owners and their families, property owners, and families of workers either living on the property or workers where the property is their primary employment.
- use of the social and cultural area for forestry, fishing, recreation, business and industry, tourism, aquaculture, and Indigenous cultural use of flora and fauna.

Cross-reference this section with Section 7.1 (refer to page 61)Description of affected local and regional economies.

### 6.1.4. Workforce profile

The SIA should include a profile of the workforce that describes the following:

**Workforce demand**

The estimated composition of workforce by occupation, project stage and duration (including any planned construction prior to final investment decision) using the template provided at **www.skills.qld.gov.au/significantprojects.aspx**

**Supply issues and strategies**

- Analysis of relevant local, state and national workforce profiles and labour supply
- strategies and proposed programs for:
  - recruitment and attraction
  - population groups (including Indigenous people, women, secondary school students and unemployed and underemployed)
  - unskilled and semi-skilled labour requirements
  - structured training (apprenticeships, traineeships, graduates)
  - analysis of impact on local community workforce.

The fact sheet on Skills Queensland's website (**www.skills.qld.gov.au/significantprojects.aspx**) provides essential information, contact and program details to develop the workforce management plan.

## 6.2. Potential impacts

Assess and describe the type, level and significance of the project's social impacts (both beneficial and adverse) on the local and cultural area, based on outcomes of community engagement processes and the social baseline study. Furthermore:

- describe and summarise outcomes of community engagement processes including the likely response of the affected communities, including Indigenous people
- include sufficient data to enable affected local and state authorities to make informed decisions about the project's effect on their business and plan for the provision of social infrastructure in the project's social and cultural area. If the

project is likely to result in a significant increase in the population of the area, then the proponent should consult the relevant management units of the state authorities and summarise the results of the consultations

- address direct, indirect and secondary impacts from any existing projects and the proposed project including an assessment of the size, significance, and likelihood of these impacts at the local and regional level. Consider the following:
  - key population and demographic shifts; disruptions to existing lifestyles, the health and social wellbeing of families and communities; social dysfunction including alcohol and drugs, crime, violence, and social or cultural disruption due to population influx
  - the needs of vulnerable groups including women, children and young people, the aged and people with a disability
  - Indigenous peoples including cultural property issues
  - local, regional and state labour markets during the construction and operational phases, with regard to the source of the workforce. Present this information according to occupational workforce groupings. Detail whether the proponent and/or contractors are likely to employ locally or through other means and whether there are initiatives for local employment business opportunities and how these workforce strategies relate and align to state and Commonwealth resource workforce planning, skill development and training strategies and policies
  - proposed new skills and training related to the project including the occupational skill groups required and potential skill shortages anticipated
  - how much service revenue and work from the project would be likely to flow to the project's social and cultural area
  - impacts of construction and operational workforces, their families, and associated contractors on housing and accommodation availability and affordability, land use and land availability. Discuss the capability of existing housing and rental accommodation to meet any additional demands created by the project, including direct impacts on Indigenous people.

### 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 the Office of the Coordinator-General, if they overlap the proposed project in the same timeframe as its construction period.

## 6.3. Impact mitigation measures and management strategies

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

- recruitment and training of the construction and operational workforces and the social and cultural implications this may have for the host community, including if any part of the workforce is sourced from outside the social and cultural area
- housing and accommodation issues—the *Major resource projects housing policy* (Department of Employment, Economic Development and Innovation 2011b) sets out the core principles to guide the identification and assessment of accommodation and housing impacts and development of mitigation and management strategies
- demographic changes in the profile of the region and the associated sufficiency of current social infrastructure, particularly health and welfare, education, policing and emergency services
- adequate provision of education, training and employment for women, people with a disability, and Indigenous peoples.

Describe any consultation about acceptance of proposed mitigation strategies, and how practical management and monitoring regimes would be implemented.

### 6.3.1. Social impact management plan

Present a draft social impact management plan (SIMP) that promotes an active and ongoing role for impacted communities and local authorities through the project life cycle. The draft plan should cover:

- assignment of accountability and resources
- updates on activities and commitments
- mechanisms to respond to public enquiries and complaints
- mechanisms to resolve disputes with stakeholders
- periodic evaluation of the effectiveness of community engagement processes
- practical mechanisms to monitor and adjust mitigation strategies and action plans
- action plans to implement mitigation strategies and measures.

For further information on preparing the SIMP, refer to *Social impact assessment: Guideline to preparing a social impact management plan* (Department of Infrastructure and Planning 2010).

# 7. Economies and management of impacts

## 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. Include:

- a map illustrating the local and regional economies (local government areas—LGAs) that could be potentially affected by the project
- gross regional product or other appropriate measure of annual economic production

- demographic and employment profile of the study area as a whole and disaggregated by LGA. Include:
  - existing population (size, age, distribution)
  - existing community profiles of the LGAs directly affected by the project (household type, size, average income)
  - existing employment statistics (part-time/full-time, by occupation)
  - the regional economy's key industries and their contribution to regional economic income
- sufficient baseline economic data to underpin a comprehensive assessment of the direct, indirect, cumulative, costs and impacts of the project
- the key regional markets relevant to the project:
  - labour market
  - education and training markets
  - housing and land markets
  - construction services and building inputs market
  - regional competitive advantage and expected future growth.

With regard to the region's key industries and factor prices, provide information on:

- current input costs (for example, wage rates, building costs, housing rent)
- land values in the region by type of use.

## 7.2. Potential impacts and mitigation measures

The potential impacts should consider local, regional, state and national perspectives as appropriate to the scale of the project.

The analysis should describe both the potential and direct economic impacts including estimated costs, if material, on industry and the community, assessing the following:

- property values
- industry output
- employment
- the indirect impacts likely to flow to other industries and economies from developing the project, and the implications of the project for future development
- the distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups.

### 7.2.1. Strategies for local participation

The assessment of economic impacts should outline strategies to encourage participation by local industry and the local workforce, including:

- strategies for assessing the capacity and cost-effectiveness of sourcing goods and services from the regional and wider state economy during the pre-construction, construction, operation and rehabilitation phases of the project

- 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. Government-funded projects must prepare a Local Industry Participation Plan (LIPP) in accordance with the *Local Industry Policy – A Fair Go for Queensland* (Queensland Government, 2010) and its associated Guidelines. Private sector projects without government funding are recommended voluntarily to apply the Policy's principles, for example by preparing a LIPP and working with the Queensland Office of the Industry Capability Network (**www.icnqld.org.au**) to promote tender opportunities and identify capable local suppliers. Assistance with developing LIPPs and delivery strategies is available from the Industry Development unit of the Department of State Development, Infrastructure and Planning
- employment strategies for local residents including members of Indigenous communities and people with a disability, including a skills assessment and recruitment and training programs to be offered
- strategies adopting relevant government policy, relating to:
- the level of training provided for construction contracts on Queensland Government building and construction contracts, with regard to the *Queensland Government Building and Construction Contracts Structured Training Policy*—the 10 per cent training policy (Skills Queensland 2008)
- Indigenous employment opportunities—the *Indigenous Employment Policy for Queensland Government: Building and Civil Construction Projects*—the 20 per cent policy (Department of Employment, Economic Development and Innovation 2008a) could be adopted or its implementation measures used as a guide or tool for engaging Indigenous workers

### 7.2.2. Impact upon property management

Address the current and future management processes for adjacent properties that are likely to be impacted by the project during construction and/or operation. Mention the:

- impact of the project on existing agricultural land uses and management practices (for example, disruption to stockyards, fences, water points, sowing or harvesting of crops, movement of livestock, agricultural machinery and any loss of agricultural land)
- impact of the project on residential, commercial and industrial land uses, property values and property management practices
- range of measures required to mitigate real and potential disruptions to rural, residential, commercial and industrial property uses and management practices.

# 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, which may include but are not restricted to:

- identifying potential hazards, accidents, spillages, fire and abnormal events that may occur during all stages of the project, including possible risk of occurrence
- identifying all hazardous substances to be used, stored, processed or produced and the rate of usage
- potential wildlife hazards, natural events (for example, cyclone, storm surge, flooding, bushfire) and implications related to climate change.

Undertake a preliminary risk assessment for all components of the project, as part of the EIS process in accordance with *Australia/New Zealand AS/NZS ISO 31000:2009 Risk management—Principles and guidelines* (Standards Australia/Standards New Zealand 2009) and *Managing environment-related risk* (HB203:2012) (Standards Australia 2012). 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.

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
- marine collision if relevant
- spills of materials during loading, unloading and transport
- the extent of heatflux and/or overpressure zones following hazard/ignition incidents (for example, in terms of 23 $kW/m^2$, 5 $kW/m^2$ heatflux and 35 kPa and 7 kPa overpressure end points)
- natural events such as cyclones, earthquakes, bushfires or local flooding.

A set of representative incident scenarios should be selected. This set should include credible event scenarios (for example, a catastrophic failure of a processing unit and the consequential explosion zone). This will require an evaluation of the likelihood of each scenario occurring in order to calculate the level of risk in surrounding areas due to the presence of the facility.

The risk analysis should include fatality and serious injury consequences, and present individual fatality risk contours at 0.5, 1, 5, 10, and 50 x $10^{-6}$ per year and injury risk contours at 10 and 50 x $10^{-6}$ per year. Risk contours should be presented on a suitably scaled location map.

In addition, the proponent must undertake a detailed risk assessment of the plant and associated operational activities to identify risks and mitigation measures to ensure containment within the site boundaries, so as not to impact on future industrial development on adjacent industrial land. Any identified impact on the project should also be extended to determine the resultant impact on the surrounding areas and community.

Assess the acceptability of the risk on site and to surrounding land uses by referring to nationally adopted risk criteria presented in the New South Wales Department of Urban Affairs and Planning's *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* (Department of Planning (NSW) 2008). Provide details of the methodology and results of each step described above.

## 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 and water.

### 8.2.2. Potential impact and 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.

Assess the 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.

Include relevant consultation with the appropriate regional health service providers.

## 8.3. Emergency management plan

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

- marine collision minimisation, if relevant
- fire prevention/protection
- leak detection/minimisation
- release of contaminants
- emergency shutdown systems and procedures
- natural disasters.

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 relevant State planning policies that may include: 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)
- 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 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 and Emergency Management Queensland)..

# 9. Cumulative impacts

Summarise the project's cumulative impacts 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 5.4.1 of this TOR (refer to page 32).

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).

# 10. 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.

# 11. Environmental management plan

Detail the EMPs for the construction and operational phases of the project. The EMP should be developed from, and be consistent with, the information in the EIS. The EMP must meet the requirements of section 203 of the EP Act, address discrete project elements and provide life-of-proposal control strategies. It must be capable of being read as a stand-alone document without reference to parts of the EIS.

The EMP must comprise the following components for performance criteria and implementation strategies:

- the proponent's commitments to acceptable levels of environmental performance, including environmental objectives, performance standards and associated measurable indicators, performance monitoring and reporting
- impact prevention or mitigation actions to implement the commitments
- corrective actions to rectify any deviation from performance standards
- an action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
  - continuous improvement
  - environmental auditing
  - monitoring
  - reporting
  - staff training
  - where relevant, a rehabilitation program for land proposed to be disturbed under each relevant aspect of the proposal.

The recommended structure of each element of the EMP is shown below.

| **Element/issue** | **Aspect of construction or operation to be managed (as it affects environmental values).** |
|---|---|

| Element/issue | Aspect of construction or operation to be managed (as it affects environmental values). |
|---|---|
| Operational policy | The operational policy or management objective that applies to the element. |
| Performance criteria | Measurable performance criteria (outcomes) for each element of the operation. |
| Implementation strategy | The strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria and also include the implementation agency for each element of the EMP. |
| Monitoring | The monitoring requirements to measure actual performance (for example, specified limits to pre-selected indicators of change). |
| Auditing | The auditing requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria. |
| Reporting | Format, timing and responsibility for reporting and auditing of monitoring results. |
| Corrective action | The action (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for action (including staff authority and responsibility management structure). |

The proponent's commitments to environmental performance, as described in the EMP, may be included in the Coordinator-General's evaluation report as conditions, to ensure the commitments are met. Therefore, the EMP is a relevant document for project approvals, environmental authorities and permits, and may be referenced by them.

# 12. Conclusions and recommendations

Make conclusions and recommendations with respect to the project, based on the studies presented, the EMP, the SIMP 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/subsection of the TOR with the corresponding section/subsection 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 3.7 (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.

# Acronyms and abbreviations

| Acronym/abbreviation | Definition |
|---|---|
| ACH Act | *Aboriginal Cultural Heritage Act 2003* (Qld) |
| AHD | Australian Height Datum |
| AS/NZS | Australian standard/New Zealand standard |
| CAMBA | China–Australia Migratory Bird Agreement |
| CHMP | cultural heritage management plan |
| Coastal Act | *Coastal Protection and Management Act 1995* (Qld) |
| DAFF | The Department of Agriculture, Fisheries and Forestry, Queensland |
| DEHP | Department of Environment and Heritage Protection, Queensland |
| DNPRSR | Department of National Parks, Recreation, Sport and Racing |
| DNRM | Department of Natural Resources and Mines |
| EIS | environmental impact statement |
| EMP | environmental management plan |
| EP Act | *Environmental Protection Act 1994* (Qld) |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) |
| EPP | environmental protection policy (water, air, waste, noise) |
| ERA | environmentally relevant activity |
| JAMBA | Japan–Australia Migratory Bird Agreement |
| ML | megalitres |
| MNES | matters of national environmental significance (under the EPBC Act) |
| NC Act | *Nature Conservation Act 1992* (Qld) |
| NGA | National Greenhouse Accounts |
| NT agreement | native title agreement |
| RE | regional ecosystem (for a definition, refer to the Glossary) |
| REDD | Regional Ecosystem Description Database |
| ROKAMBA | Republic of Korea–Australia Migratory Bird Agreement |
| SCL Act | *Strategic Cropping Land Act 2011* (Qld) |
| SDPWO Act | *State Development and Public Works Organisation Act 1971* (Qld) |
| SIA | social impact assessment |
| SPA | *Sustainable Planning Act 2009* (Qld) |
| The proponent | Cape Alumina Limited |
| TI Act | *Transport Infrastructure Act 1994* (Qld) |
| TOR | terms of reference |
| TORUM Act | *Transport Operations (Road Use Management) Act 1995* (Qld) |
| VM Act | *Vegetation Management Act 1999* (Qld) |

# 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. |
| Australian Height Datum (AHD) | A mapping system applied to Australia, which uses a datum, or agreed level, from which the heights of naturally occurring features can be measured; this level, to which the value of zero is given, is equivalent to the mean sea level for 1966–68 at thirty tide gauges around the coast of the Australian continent. |
| benthic substrate | Pertaining to the bottom of a body of water. |
| 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:<br>a) regional diversity, that is, the diversity of the landscape components of a region, and the functional relationships that affect environmental conditions within ecosystems<br>b) ecosystem diversity, that is, the diversity of the different types of communities formed by living organisms and the relations between them<br>c) species diversity, that is, the diversity of species<br>d) genetic diversity, that is, the diversity of genes within each species. |
| bunding | An artificial created boundary, usually in the form of an embankment used to prevent sediment and substances from entering a water steam or storage facility. |
| cathodic protection | Method of protection for iron and steel against electrochemical corrosion |
| 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. |
| Coordinator-General | The corporation sole constituted under section 8A of the *State Development and Public Works Organisation Act 1938* 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:<br>• 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<br>• the habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction, or<br>• 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<br>• the survival of the wildlife in the wild is unlikely if a threatening process continues. |
| 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. |
| geomorphorlogical | 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:<br>(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. |
| 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 significant 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 -<br>- covering more than 50% of the undisturbed predominant canopy;<br>- avering more than 70% of the vegetation's undisturbed height; and<br>- composed of species characteristic of the vegetation's undisturbed predominant canopy |
| riparian | Pertaining to, or situated on the bank of, a body of water, especially a watercourse such as a river. |
| riparian zone | Located alongside a watercourse. |
| 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. |
| significant project | A project declared as a 'significant project' by the Coordinator-General, under section 26 of the SDPWO Act. |
| 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) |

# References


Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *The Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian Water Association (Artarmon) and NZ Water and Wastes Association (Auckland), viewed 7 June 2012, <http://www.daff.gov.au/oldmincos/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality>.

Commonwealth of Australia 1992, *National Strategy for Ecologically Sustainable Development*, Ecologically Sustainable Development Steering Committee, Canberra, viewed 7 June 2012, <http://www.environment.gov.au/about/esd/publications/strategy/index.html>.

——2003, *Recovery Plan for Marine Turtles in Australia*, Marine Species Section, Approvals and Wildlife Division, Environment Australia, Canberra, viewed 5 June 2012, <http://www.environment.gov.au/coasts/publications/turtle-reocvery/pubs/marine-turtles.pdf>.

——2009a, *National Assessment Guidelines for Dredging*, Department of Environment, Water, Heritage and the Arts, Canberra, viewed 7 June 2012, <http://www.environment.gov.au/coasts/pollution/dumping/publications/pubs/guidelines09.pdf>.

——2010c, *National Greenhouse Accounts (NGA) Factors*, Department of Climate Change and Energy Efficiency, Canberra, viewed 7 June 2012, <http://www.climatechange.gov.au/~/media/publications/greenhouse-acctg/national-greenhouse-factors-july-2010-pdf.pdf>.

Department of Agriculture, Fisheries and Forestry 2012, Marine fish habitat offset policy (FHMOP 005.2), Fisheries Queensland, Brisbane, viewed 19 December 2012, <http://www.daff.qld.gov.au/documents/Fisheries_Habitats/Marine-Fish-Habitat-Offset-Policy-12.pdf>.

Department of Education, Training and the Arts 2008, Queensland Skills Plan, Department of Education, Training and the Arts, Brisbane, viewed 19 December 2012, <http://training.qld.gov.au/resources/information/pdf/skills-plan-2008.pdf>

Department of Employment, Economic Development and Innovation 2008a, *Indigenous Employment Policy for Queensland Government: Building and civil construction projects*, Department of Employment, Economic Development and Innovation, Brisbane, viewed 7 June 2012, <http://www.employment.qld.gov.au/pdf/eii/iep-policy-building-&-civil-construction-projects.pdf>.

——2010, *Local Industry Policy*, Department of Employment, Economic Development and Innovation, Brisbane, viewed 17 July 2012, <http://www.industry.qld.gov.au/documents/AdvancedManufacturing/local-industry-policy.pdf>.

——2011a, *Local Industry Policy Guidelines*, Department of Employment, Economic Development and Innovation, Brisbane, viewed 7 June 2012, <http://www.industry.qld.gov.au/documents/AdvancedManufacturing/LIP-guidelines.pdf>.

——2011b, *Major resource projects housing policy*, Department of Employment, Economic Development and Innovation, Brisbane, viewed 17 July 2012 <http://www.deedi.qld.gov.au/cg/major-project-resource-housing-policy.html>.

Department of Environment 1998, *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland,* Department of Environment, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/register/p00090aa.pdf>.

Department of Environment and Resource Management 2009a, *Queensland Water Quality Guidelines, Version 3*, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/water/guidelines/queensland_water_quality_guidelines_2009.html>.

——2009b, State Policy for Vegetation Management, version 2, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/vegetation/pdf/state_policy_nov_2009.pdf>.

——2010, *Offsets for Net Gain of Koala Habitat in South East Queensland Policy*, Department of Environment and Resource Management, Brisbane, viewed 7 June 2012, <http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/koalas/strategy/pdf/offset-netgain.pdf>.

——2011a, *Ecological Equivalence Methodology Guideline: Policy for Vegetation Management Offsets*, version 1, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/environmental_management/environmental-offsets/pdf/ecological-equivilance-methodology.pdf>.

——2011b, Policy for Vegetation Management Offsets, version 3, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/environmental_management/environmental-offsets/pdf/policy-for-vegetation-management-offsets.pdf>.

——2011c, Queensland Biodiversity Offset Policy (version 1), Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://derm.qld.gov.au/environmental_management/environmental-offsets/pdf/biodiversity-offset-policy.pdf>.

——2011d, State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments, Department of Environment and Resource Management, Brisbane, viewed 19 December 2012, <http://www.ehp.qld.gov.au/ecosystems/wetlands/wetlands-spp.html>.

——2011e, State Policy: Coastal Management, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/coastalplan/pdf/qcp-web-coastal-management.pdf>.

——2012a *Coastal Hazards Guideline*, Department of Environment and Resource Management, Brisbane, viewed 19 December 2012, <http://www.ehp.qld.gov.au/coastalplan/pdf/hazards-guideline.pdf>.

——2012b, *Queensland Coastal Plan*, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/coastalplan/pdf/qcp-web.pdf>.

——2012c, State Planning Policy 1/12: Protection of Queensland's Strategic Cropping Land, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/land/planning/strategic-cropping/legislation-planning.html>.

Department of Infrastructure and Planning 2009*, South East Queensland Regional Plan 2009–2031*, Department of Infrastructure and Planning, Brisbane, viewed 17 July 2012, <http://www.dsdip.qld.gov.au/regional-planning/south-east-queensland-regional-plan-2009-2031.html>.

——2010, *Social impact assessment: Guideline to preparing a social impact management plan*, Department of Infrastructure and Planning, Brisbane, viewed 17 July 2012, <http://www.deedi.qld.gov.au/cg/resources/guideline/simp-guideline.pdf>.

Department of Local Government and Planning and Department of Emergency Services 2003, State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide, Brisbane, viewed 17 July 2012, <http://www.emergency.qld.gov.au/publications/spp/pdf/spp.pdf>.

Department of Main Roads 2006, *Guidelines for Assessment of Road Impacts of Development*, Department of Main Roads, Brisbane, viewed 7 June 2012, <http://www.tmr.qld.gov.au/~/media/ace67ef2-b6c3-46a3-91a7-39f790c309fe/garid_guidelines_200406.pdf>.

Department of Minerals and Energy 1995, *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland*, Department of Minerals and Energy, Brisbane, viewed 19 December 2012, <http://www.ehp.qld.gov.au/land/mining/technical_guidelines.html>.

Department of Mines and Energy 2007a, State Planning Policy 2/07: Protection of Extractive Resources, Department of Mines and Energy, Brisbane, viewed 17 July 2012, <http://mines.industry.qld.gov.au/assets/land-tenure-pdf/dme_stateplan_policy_1.pdf>.

——2007b, *State Planning Policy 2/07 Guideline: Protection of Extractive Resources*, Department of Mines and Energy, Brisbane, viewed 17 July 2012, <http://mines.industry.qld.gov.au/assets/land-tenure-pdf/dme_stateplan_guideline.pdf>.

Department of Natural Resources and Mines 2012, Regional Vegetation Management Code for Western Bioregions, version 2.1, Department of Natural Resources and Mines, Brisbane, viewed 19 December 2012, <http://www.derm.qld.gov.au/vegetation/pdf/western-code-nov-2012.pdf>.

Department of Natural Resources and Mines and Department of Local Government and Planning 2002a, State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils, Department of Natural Resources and Mines and Department of Local Government and Planning, Brisbane, viewed 17 July 2012, <http://www.dsdip.qld.gov.au/resources/policy/ass-spp-oct-02.pdf>.

Department of Natural Resources and Mines and Department of Local Government and Planning 2002b, *State Planning Policy 2/02 Guideline: Acid Sulfate Soils*, Department of Natural Resources and Mines and Department of Local Government and Planning, Brisbane, viewed 17 July 2012, <http://www.dsdip.qld.gov.au/resources/policy/spp-guidelines-oct-02-v2.pdf>.

Department of Planning (NSW) 2008, *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning*, consultation draft, Sydney, viewed 7 June 2012, <http://www.planning.nsw.gov.au/plansforaction/pdf/hazards/haz_hipap4_rev2008.pdf>.

Department of Primary Industries 1990, *Guidelines for agricultural land evaluation in Queensland*, Land Resources Branch, Department of Primary Industries, Brisbane.

Department of Science, Information Technology, Innovation and the Arts 2012, *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland*, Department of Science, Information Technology, Innovation and the Arts, Brisbane, viewed 19 December 2012, <http://www.ehp.qld.gov.au/ecosystems/biodiversity/fauna-survey.html>.

Department of Main Roads 2008, *Road traffic noise management: code of practice*, Department of Main Roads, Brisbane, viewed 19 December 2012, <http://www.tmr.qld.gov.au/businessindustry/Technical-standards-publications/Road-traffic-noise-management-code-of-practice.aspx>.

Department of Primary Industries and Department of Housing, Local Government and Planning 1992, State Planning Policy 1/92: Development and the Conservation of Agricultural Land, Department of Primary Industries and Department of Housing, Local Government and Planning, Brisbane, viewed 17 July 2012, <http://www.dsdip.qld.gov.au/resources/policy/spp1-92.pdf>.

——1993, *Planning guidelines: The identification of good quality agricultural land*, Department of Primary Industries and Department of Housing, Local Government and Planning, Brisbane, viewed 17 July 2012, <http://www.dsdip.qld.gov.au/resources/policy/plng-guide-identif-ag-land.pdf>.

Department of State Development, Infrastructure and Planning 2012, Draft Coastal Protection State Planning Regulatory Provision: Protecting the coastal environment, Department of State Development, Infrastructure and Planning, Brisbane, viewed 19 December 2012, <http://www.dsdip.qld.gov.au/codes-policies-and-regulatory-provisions/state-planning-regulatory-provisions.html>.

Department of Transport and Main Roads 2010, *Queensland Road Safety Action Plan 2010–2011*, Department of Transport and Main Roads, Brisbane, viewed 7 June 2012, <http://www.tmr.qld.gov.au/~/media/61ac4911-1036-410f-a048-6b13a16a4f66/pdf_road_safety_action_plan_2010_2011_web.pdf>

Dixon, M and Beumer, J 2002, *Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss: Departmental procedures*, *Fish Habitat Management Operational Policy FHMOP 005*, Queensland Fisheries Service, Department of Primary Industries, Brisbane, viewed 17 July 2012, <http://www.dpi.qld.gov.au/documents/Fisheries_Habitats/FHMOP005-Fish-Hab-Manage.pdf>.

Environmental Protection Agency 2000, *Noise Measurement Manual*, 3rd edn, Department of Environment and Resource Management, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/register/p00367aa.pdf>.

——2004, *Guideline: Planning for Noise Control*, Environmental Protection Agency, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/register/p01369aa.pdf>.

——2006, *Guideline: Noise and vibration from blasting*, Environment Protection Agency, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/register/p01382aa.pdf>.

——2008a, *Guideline: EPA Best Practice Urban Stormwater Management – Erosion and Sediment Control*, Environmental Protection Agency, Brisbane, viewed 17 July 2012, <http://www.derm.qld.gov.au/register/p02301aa.pdf>.

——2008b, Queensland Government Environmental Offsets Policy, Environmental Protection Agency, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/register/p02501aa.pdf>.

Eyre, TJ, Kelly, AL, Neldner, VJ, Wilson, BA, Ferguson, DJ, Laidlaw, MJ and Franks, AJ 2011, *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland: Assessment Manual*, version 2.1, Department of Environment and Resource Management, Biodiversity and Ecosystem Sciences, Brisbane, viewed 17 July 2012, <http://www.ehp.qld.gov.au/ecosystems/biodiversity/pdf/biocondition_manual.pdf>.

Eyre TJ, Ferguson DJ, Hourigan CL, Smith GC, Mathieson MT, Kelly, AL, Venz MF & Hogan, LD. 2012. *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland*. Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Available from website: : http://www.ehp.qld.gov.au/ecosystems/biodiversity/fauna-survey.html

Hopkins, E, White, M and Clarke, A 1998, *Restoration of fish habitats: Fisheries guidelines for marine areas*, Fish habitat guideline FHG 002, Department of Primary Industries, Fisheries Group, Brisbane, viewed 7 June 2012, <http://www.daff.qld.gov.au/documents/Fisheries_Habitats/FHG002-Fish-Habitat-Guideline.pdf>.

Institution of Engineers Australia 1996, *Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites*, Institution of Engineers Australia Queensland Division, Brisbane.

International Maritime Organization 2003, *International Ship and Port Facility Security Code*, International Maritime Organization, London.

Isbell, RF and CSIRO 2002, *The Australian soil classification*, CSIRO Publishing, Collingwood, Victoria.

Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia 2004, *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore reserves*, Joint Ore Reserves Committee, Carlton South, Victoria, viewed 7 June 2012, <http://www.jorc.org/main.php>.

McKenzie, NJ et al. 2008, *Guidelines for Surveying Soil and Land Resources*, 2nd edn, CSIRO Publishing, Melbourne.

National Committee on Soil and Terrain 2009, *Australian soil and land survey field handbook*, 3rd edn, CSIRO Publishing, Collingwood.

Queensland Reconstruction Authority 2011, Temporary SPP 2/11: Planning for stronger, more resilient floodplains, Queensland Reconstruction Authority, Brisbane, viewed 19 December 2012, <http://www.floodcommission.qld.gov.au/__data/assets/pdf_file/0012/10920/QFCI_Exhibit_1006_Temporary_State_Planning_Policy_2-11_-_Planning_for_Stronger__More_Resilient_Floodplains.pdf>.

Skills Queensland 2008, *Government Building and Construction Contracts Structured Training Policy*, Skills Queensland, Brisbane, viewed 7 June 2012, <http://www.skills.qld.gov.au/DownloadAttachment.ashx?AttachmentId=136298>.

Standards Australia 2012, *Managing environment-related risk* (HB203:2012), Standards Australia, Sydney.

Standards Australia and Standards New Zealand 2009, *Risk Management—Principles and guidelines* (AS/NZS ISO 31000:2009), Standards Australia (Sydney) and Standards New Zealand (Wellington).

PO Box 15517 City East Qld 4002 Australia
**tel** 13 QGOV (13 74 68) **email** info@dsdip.qld.gov.au
**www.dsdip.qld.gov.au**

QUEENSLAND GOVERNMENT