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Terms of reference

Terms of reference for an environmental impact statement

Terms of reference for the Surat Gladstone Pipeline Project EIS

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Queensland Government

Background

Surat Gladstone Pipeline Pty Ltd (ACN 133 104 855) (SGP), a wholly owned subsidiary of Arrow Energy Ltd, is proposing to construct a 470km long, 660mm nominal diameter buried high pressure steel gas pipeline to deliver coal seam gas (CSG) from Queensland's Surat Basin gas fields to a proposed liquefied natural gas (LNG) plant located at Fishermans Landing in Gladstone. The LNG plant is subject to a separate assessment process under the *Environmental Protection Act 1994* (EP Act).

The pipeline would have a minimum technical design life of 40 years. However, with ongoing integrity management the operational life is expected to be in excess of this figure. The proposed pipeline traverses primarily grazing and agricultural land. A 30m wide right of way (ROW) and operational easement would be required for construction, operation and maintenance for the pipeline.

Approximately 41 km of the SGP route between Callide and the Gladstone State Development Area (GSDA) is currently being investigated by the Department of Infrastructure and Planning as a possible infrastructure corridor. This is in response to the Premier's election commitment to acquire a land corridor easement for the co-location of multi-user underground gas pipelines to transport coal seam gas from the Surat and Bowen Basins to support future LNG industrial development in the Gladstone region. The final 20 km of the SGP route will be located within the GSDA. SGP's pipeline would be designed and constructed in accordance with AS 2885:2007 Pipelines – Gas and Liquid Petroleum and accordingly, and would be buried with a minimum depth of cover of 750mm. The final depth of cover would vary along the route and would be determined by the outcomes of the detailed AS 2885 Safety Management Study. At key infrastructure and watercourse crossings, the minimum depth of cover would be increased to at least 1,200mm. The free-flow pipeline would contain above ground structures comprising main line valves, scraper stations and a gas custody transfer meter station.

Construction of the proposed pipeline is anticipated to commence in 2011 with first gas supplied to the proposed LNG Plant at Fishermans Landing in 2012. Following completion of the pipeline, previous land use would continue.

CONTENT OF THE EIS

Executive summary

The function of the executive summary is to convey the most important aspects and options relating to the project to the reader in a concise and readable form. It should use plain English and avoid the use of jargon and esoteric terms. The structure of the executive summary should follow that of the EIS, and focus strongly on the key issues and conclusions.

Glossary of terms

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

1 Introduction

The function of the introduction is to explain why the EIS has been prepared and what it sets out to achieve. In particular, the introduction should address the level of detail of information required to meet the level of approval being sought (for example, Level 1 EA for Schedule 5 Activities as defined in the Environmental Protection Regulation 2008)). It should also define the audience to whom it is directed, and contain an overview of the structure of the document. Throughout the EIS, factual information contained in the document should be referenced.

1.1 Project proponent

Provide details of the project proponent.

1.2 Project description

A brief description of the key elements of the gas pipeline corridor as well as associated infrastructure requirements should be provided and illustrated. Detailed descriptions of the project should follow in Section 3.

1.3 Project objectives and scope

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

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

1.4 The environmental impact statement (EIS) process

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

1.4.1 Methodology of the EIS

This section should provide a description of the EIS process steps, timing and decisions to be made for relevant stages of the project. A brief description should be provided of studies or surveys that have been undertaken for the purposes of developing the project and preparing the EIS. This should include reference to relevant baseline studies or investigations undertaken previously. This section should also indicate how the consultation process (which will be described in detail in section 1.5) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation.

The information in this section is required to ensure:

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

1.4.2 Objectives of the EIS

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

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

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

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

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

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

In brief, the EIS objectives should be to provide public information on the need for and likely effects of the project, to set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values, and demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values. Discussion of options and alternatives and their likely relative environmental management outcomes is a key aspect of the EIS.

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

1.4.3 Submissions

The reader should be informed as to how and when public submissions on the draft EIS can be made, and how they will be addressed and taken into account in the decision-making process.

1.5 Public consultation process

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

The submission of a list of affected persons and interested persons as well as a statement of how the proponent proposes to consult with those persons is a statutory requirement of the EIS process in the *Environmental Protection Act 1994* (See section 8). Similar requirements, though non-statutory, are usually applied to EIS processes under other State legislation.

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

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

decommissioning. Refer to the Department of Environment and Resource Management (DERM) guideline *Issue Identification and Community Consultation.*

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

This section should explain the legislation and policies controlling the approvals process. Reference should be made to the Queensland *Environmental Protection Act 1994*, *Integrated Planning Act 1997*, *Nature Conservation Act 1992, Land Act 1994*, *Forestry Act 1959* and other relevant Queensland laws. Reference should also be made to the *State Development and Public Works Organisation Act 1971* and in particular section 84 which relates to the use of the land under an approved development scheme within a State development area. The final 20 km of the SGP will be within the GSDA. Any requirements of the Commonwealth EPBC Act should also be included.

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

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

1.6.2 Planning processes and standards

This section should discuss the project's consistency with existing land uses or long-term policy framework for the area (e.g. as reflected in local and regional plans), and with legislation, standards, codes or guidelines available to monitor and control operations on site. The EIS should provide detail on how the project will comply with the *Code of Environmental Practice - Onshore Pipelines* published by the Australian Pipeline Industry Association (APIA). This section should refer to all relevant State and regional planning policies. This information is required to demonstrate how the proposal conforms to State, regional and local plans and policies for the area.

1.7 Accredited process for controlled actions under Commonwealth legislation

The Surat to Gladstone Pipeline Project is not a controlled action under the Commonwealth's EPBC Act. Therefore, the State's EIS has not been accredited under the Bilateral Agreement and the TOR are not required to address matters of national environmental significance.

2 Project need and alternatives

2.1 Project justification

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

2.2 Alternatives to the project

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

Reasons for selecting the preferred options should include technical, commercial, social and natural environment aspects. In particular, the principles of ESD and sustainable development should be included.

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

3 Description of the project

The objective of this section is to describe the project through its lifetime of construction and operation and decommissioning. This information is required to allow assessment of all aspects of a proposal including all phases of the proposal from planning, construction and operation through to decommissioning. It also allows further assessment of which approvals may be required and how they may be managed through the life of the proposal. Maps or figures showing the position of features or boundaries should use the GDA94 datum. The GDA94 datum should also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals.

3.1 Location

3.1.1 Regional context

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

3.1.2 Local context

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

- the location and boundaries of land tenures, in place or proposed, to which the pipeline easement is or will be subject; and
- the location of any aquatic features (e.g. rivers, streams, creeks, swamps, other waterbodies and wetlands); and
- the location and boundaries of the pipeline easement showing all key aspects.

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

3.1.3 Co-location

Opportunities may exist for efficiency gains and the mitigation of environmental and property impacts through the co-location of the pipeline with other proposed linear infrastructure in, near or parallel to, the pipeline corridor.

The Queensland Government encourages the co-location of multi-user pipelines within an infrastructure corridor to provide certainty for industry proponents and to diminish the impact on affected landowners.

The EIS should identify any other proposals to develop infrastructure within the vicinity of the pipeline investigation corridor. Any other proposals for linear infrastructure within the corridor that would be incompatible with the SGP should also be identified. Such proposals would be limited to those projects which are in the public arena during the period of preparation of this EIS and for which a proponent can be readily identified.

While this EIS would not evaluate the environmental impacts of other infrastructure not directly required for this Project, the EIS should describe the implications of locating other forms of linear infrastructure within or near the pipeline corridor. Where co-location may be likely, the EIS should consider opportunities to coordinate or enhance any of the impact mitigation strategies proposed for the pipeline corridor through cooperation with other proponents in the locality. In particular, the potential implication of any infrastructure co-location on pipeline corridor width and alignment should be described.

3.2 Construction and commissioning

The extent and nature of the project's construction phase should be described. The description should include the type and methods of construction, the construction equipment to be used and the items of plant to be transported onto the construction site. Any staging of the proposal should be described and illustrated showing site boundaries, development sequencing and timeframes. The estimated numbers of people to be employed in the project construction phase should also be provided with a brief description of where those people may be accommodated and/or how they will be transported to the site. Requirements for commissioning of the pipeline, i.e. the pressure build up with the introduction of coal seam gas into the pipeline and associated venting should be outlined.

3.3 Operations

The operation of the pipeline should be described in the text. Operational issues to be addressed should include, but may not be limited to:

- a description of the pipeline;
- the capacity of the pipeline,
- operational controls for the pipeline; and
- any lubricants to be used during maintenance.

3.4 Tenements and tenures

Describe and illustrate any existing underlying mining tenements and geothermal and petroleum tenure and licences traversed by the proposed pipeline. The tenure of the SGP route should also be described, including the tenure of the potential infrastructure corridor between Callide and the GSDA and the tenure within the GSDA.

3.5 Infrastructure requirements

This section should provide a description of requirements for the construction of any infrastructure required for the project. The location of the proposed pipeline easement should be shown on a plan. The matters to be considered may include such infrastructure as access tracks, local roads, dams, quarries, sand extraction sites, major transmission power lines and other major telecommunications cables, wireless technology (e.g. microwave telecommunications), and pipelines (whether underground or above).

3.5.1 Transport—road/rail/air/ship

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

3.5.2 Energy

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

3.5.3 Water supply

The EIS should provide information on water usage by the project, including the quality and quantity of water. In particular, the proposed and optional sources of water supply for hydrostatic testing and dust suppression should be described (e.g. bores, any surface storages such as dams and weirs, municipal water supply pipelines).

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

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

3.5.4 Sewerage

This section should describe, in general terms, the sewerage infrastructure required by the project for proposed camp sites.

3.5.5 Accommodation and other infrastructure

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

- camps (including medical facilities);
- fuel storage areas; and
- hardstand/maintenance areas.

3.6 Waste management

Provide an inventory of wastes to be generated by the proposal during the construction, operational and decommissioning phases of the project. Having regard for best practice waste management strategies and the Environmental Protection (Waste Management) Policy 2000 (EPP (Waste)), the proposals for waste avoidance, reuse, recycling, treatment and disposal should be described in the appropriate subsection below. Information should also be provided on the variability, composition and generation rates of all waste produced at the site.

3.6.1 Air emissions

Describe the quantity and quality of air emissions (commissioning and purging of the pipeline) during construction and operation.

The methods to be employed in the mitigation of impacts from air emissions should be described in section 4.7.

3.6.2 Excavated waste

This section should outline the disposal of any waste rock or material associated with the construction of the pipeline.

Outline any alternatives for excavated waste disposal, including off-site options and treatment of any potential contaminated soil.

3.6.3 Liquid waste

A description should be presented of the origin, quality and quantity of wastewater and any immiscible liquid waste originating from the project other than that addressed in previous sections.

The EIS may need to consider the following effects:

- groundwater from excavations;
- rainfall directly onto disturbed surface areas;
- run-off from roads;
- drainage (i.e. run-off plus any seepage or leakage); and
- treatment and disposal of hydrostatic test water,.

3.7 Rehabilitation and decommissioning

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the proposal. The strategic approach to progressive and final rehabilitation should be described. A preferred rehabilitation strategy should be developed with a view to minimising the amount of land disturbed at any one time.

Describe the reinstatement of creek banks disturbed by open trenching during construction of the pipeline. A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed.

Detail of the impacts of the preferred rehabilitation strategy should be discussed in the appropriate subsections of Section 4 (Environmental values and management of impacts) particularly with regard to such issues as erosion and stability (section 4.2.2.4), rehabilitation of flora (section 4.9.2), and the rehabilitation of creek crossings (section 4.8.2 and 4.5.2). Implications for the long-term use of the site should also be addressed.

The means of decommissioning the pipeline and any above ground facilities, should be described, and the methods proposed for the stabilisation of the affected areas should be given. Information should be provided regarding decommissioning and rehabilitation of the site, removal of any infrastructure and rehabilitation of disturbed areas. Options for the disposal of any waste material from decommissioning should be discussed in sufficient detail for their feasibility and suitability to be established.

4 Environmental values and management of impacts

The functions of this section are to:

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

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

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

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

- Environmental values affected: describe the existing environmental values of the area to be affected including values and areas that may be affected by any cumulative impacts (refer to any background studies in appendices - note such studies may be required over several seasons). It should be explained how the environmental values were derived (e.g. by citing published documents or by following a recognised procedure to derive the values).
- Impact on environmental values: describe quantitatively the likely impact of the proposal on the identified environmental values of the area. The cumulative impacts of the proposal must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. Requirements and recommendations of relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans should be addressed.
- Environmental protection objectives: describe qualitatively and/or quantitatively the proposed objectives for enhancing or protecting each environmental value. Where applicable, include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). The measurable indicators and standards can be determined from legislation, support policies and government policies as well as the

expected performance of control strategies. Objectives for progressive and final rehabilitation and management of contaminated land should be included.

- Control strategies to achieve the objectives: describe the control principals, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives; include designs, relevant performance specifications of plant. Details are required to show that the expected performance is achievable and realistic.
- Environmental offsets: Information is required to show that measures have been taken to avoid and minimise potential adverse impacts of the proposal. Environmental offsets may be proposed to counterbalance any remaining loss of environmental values, consistent with the specific-issue offset policies under the framework of the *Queensland Government Environmental Offset Policy 2008.*
- Monitoring programs: describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals.
- Auditing programs: describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed.
- Management strategies: describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented, such as by a continuous improvement framework, including details of corrective action options, reporting (including any public reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment.
- Information quality: information given under each element should also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

It is recommended that the final TOR and the EIS follow the heading structure shown below. The mitigation measures, monitoring programs, etc., identified in this section of the EIS should be used to develop the environmental management plan for the project (see section 5).

4.1 Climate

This section should describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind and any other special factors which may affect the construction program of the proposal. Extremes of climate (droughts, floods, cyclones, etc) should also be discussed with particular reference to the construction program. The vulnerability of the area to natural or induced hazards, such as flood, bushfire and landslide should also be addressed. The relative frequency and magnitude of these events should be considered together with the risk they pose to management of the project.

The potential impacts due to climatic factors should be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion should be addressed in Section 4.2.

4.2 Land

4.2.1 Description of environmental values

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

4.2.1.1 Topography/geomorphology

The topography along the pipeline route should detail elevations and be drafted to the GDA 94 datum. Significant features of the pipeline route should be included on the maps. Such features would include any locations subsequently referred to in the EIS (e.g. the nearest noise sensitive locations) that are not included on other maps in Section 4.2. Commentary on the maps should be provided highlighting the significant topographical features.

4.2.1.2 Geology

The EIS should provide a description and map of the geology along the proposed pipeline route, with particular reference to surface and sub-surface materials and geological structures eg type of rock, which may impact on the normal construction of the pipeline.

4.2.1.3 Soils

The soil types along the pipeline route should be described at a suitable scale, with particular reference to the physical and chemical properties of the materials that will influence soil stability, erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land.

Information should also be provided on soil stability and suitability for construction of above ground facilities.

An acid sulfate soil (ASS) investigation, carried out according to QASSMAC guidelines, should be undertaken where ASS may be disturbed. The State Planning Policy 2/02 *Planning and managing development involving acid sulfate soils* should also be addressed (e.g. identification and management and format of environmental management plans) and ASS mapped at a suitable scale.

Soils should be described and mapped at a suitable scale and described according to the *Guidelines for Surveying Soil and Land Resources* (2nd Ed, McKenzie et al, 2008) and *Australian soil classification* (Isbell, 1996). An appraisal of the depth and quality of useable soil should be undertaken. An assessment should be made of each soil's agricultural land suitability in accordance with *Guidelines for agricultural land evaluation in Queensland* (Land Resources 1990), *Planning guidelines: the identification of Good Quality Agricultural Land* (DPI, DHLGP, 1993), and the *State Planning Policy 1/92: Development and the conservation of agricultural land.* The land impacted outside of the proposed petroleum lease(s) should also be investigated.

4.2.1.4 Land use

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

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

Land classified as Good Quality Agricultural Land in the DERM's land classification system is to be shown in accordance with the planning guideline, *The Identification of Good Quality Agricultural Land*, which supports *State Planning Policy 1/92.*

Information should also be provided on any quarry resources identified on State Lands under the *Forestry Act 1959.*

4.2.1.5 Infrastructure

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

4.2.1.6 Sensitive environmental areas

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

The EIS should indicate if the land affected by the proposal is, or is likely, to become part of the protected area estate, or is subject to any treaty. Consideration should be given to national parks, conservation parks, declared fish habitat areas, wilderness areas, aquatic reserves, heritage/historic areas or items, national estates, world heritage listings and sites covered by international treaties or agreements (e.g. Ramsar, JAMBA, CAMBA), areas of cultural significance and scientific reserves (see section 4.9 for further guidance on sensitive areas).

To obtain copies of plans of declared fish habitat areas contact the Department of Employment, Economic Development and Innovation or visit their website.

In addition, where EIS studies identify matters of national environmentally significant under the Commonwealth's EPBC Act, consideration should be made to a referral which would determine it the action would be a controlled action. Where a determination has been made for the action to be controlled, this section should address those matters.

4.2.1.7 Landscape character

This section should describe in general terms the existing character of the landscape that will be affected by the proposal. This section describes the general impression of the landscape that would be obtained while travelling through and around it.

4.2.1.8 Visual amenity

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

- identification of elements within the proposal and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps;
- focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site;
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;
- identification of the areas of the proposal that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and
- the value of existing vegetation as a visual screen.

4.2.2 Potential impacts and mitigation measures

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

4.2.2.1 Land use suitability

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

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

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

Identify and avoid any potential impacts (including sterilisation) on identified mineral or energy (including coal, coal seam gas, geothermal and petroleum) resources and extractive industry deposits. Describe and define the sterilisation (if any) of resources resulting from the construction or operation of the pipeline and associated infrastructure.

4.2.2.2 Land disturbance

A strategy should be developed that will minimise the amount of land disturbed at any one time. The strategic approach to progressive rehabilitation of landforms and final decommissioning should be described with particular regard to the impacts in the short, medium and long timeframes. The methods to be used for the proposal, including backfilling, covering, re-contouring, topsoil handling and revegetation, should be described. However, a description of erosion and sediment control could be deferred to section 4.2.2.4. Any proposals to disturb land that would impede or divert overland flow or waterways (including wetlands), and any subsequent reinstatement, during construction or operations should be first described in this section. However, the potential impacts of interfering with flow on the quantity and quality of water resources should be assessed in section 4.5. Also, any long-term monitoring plans should be described.

Potential land disturbance issues involved in proximity of other current or proposed infrastructure projects in the region of the pipeline corridor should be described and include opportunities for co-location of the pipeline corridor or associated services.

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

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.

4.2.2.3 Land contamination

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

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

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

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

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

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

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

4.2.2.4 Erosion and stability

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

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

- areas cleared of vegetation;
- waste dumps;
- stockpiles;
- banks and creek crossings; and
- access roads or other transport corridors.

Methods proposed to prevent or control erosion should be specified and should be developed with regard to (a) the stability of waste dumps and stockpiles; (b) preventing soil loss in order to maintain land capability/suitability, and (c) preventing significant degradation of local waterways by suspended solids. Erosion control measures (including measures for any slumping) should be developed into an erosion and sediment control plan for inclusion in the EM plan.

Management of acid sulfate soils should be based on assessment in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998* and management and monitoring plans prepared in consultation with officers of the DERM.

4.2.2.5 Landscape character

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

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

4.2.2.6 Visual amenity

This section should analyse and discuss the visual impact of the proposal on particular panoramas and outlooks. It should be written in terms of the extent and significance of the changed skyline as viewed from places of residence, work, and recreation, from road, cycle and walkways, from the air and other known vantage points day and night, during all stages of the project as it relates to the surrounding landscape. The assessment is to address the visual impacts of the project structures and associated infrastructure, using appropriate simulation. Special consideration is to be given to public roads, public thoroughfares, and places of residence or work, which are within the line-of-sight of the project.

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

4.3 Transport

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

4.3.1 Description of existing infrastructure and values

Provide details of the proposed use of existing infrastructure for the transport of materials to and from the project site. Also provide details, either in the transport section of the EIS or by cross reference to other sections, of the environmental values that would be affected by the altered use of existing transport infrastructure or the construction of new or altered infrastructure. Also provide details of the likely traffic to be generated by workforce personnel and service providers.

For road and rail transport, describe separately and in detail the existing road and rail networks that would be used by the project. Provide illustrations of the networks at suitable scales. For each mode of transport and each phase of the project, the EIS should describe: the expected volumes and weights of pipe, the likely number and timing of trips; the types of vehicles to be used; and the routes. The description should include, but not necessarily be limited to, details of access and haul roads, used by any transport associated with the project. Provide details of any heavy or oversized loads, including the number and type of vehicles, with a description of the likely timing and routes of those loads highlighting any vulnerable bridges or other structures along the proposed routes.

In relation to the importation of materials and products, the EIS should identify any aspects of the project that will increase the shipment of materials through any port. Details should be provided of the ports that would be

used, the berths at those ports, likely size and number of vessels, and the associated infrastructure that moves and stores materials between the ships and the rail and/or road networks.

4.3.2 Potential impacts and mitigation measures

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

Details should be provided of the:

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

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

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

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

- Safety and efficiency of road operations and assets for each phase of the project and activity, taking into consideration project proximity to roads; use of road reserves; road safety procedures at crossing points; and compatibility with co-located utilities;
- Safety and efficiency of project access and intersections, including those for accommodation camps;
- The likely impacts of the project on road pavements, taking into consideration construction activity for camps and other related works;
- any existing public transport networks (assets and services); and
- watercourses and overland flows, and their interaction with the current and future road network (note: impacts on water values due to transport infrastructure should be outlined in the transport section of the EIS and cross-referenced to a detailed assessment in the water resources section).

In relation to rail network impacts, the EIS should detail the rail lines and locations where the gas transmission pipeline will cross the rail network. A description of the methods to be used when crossing the railway should be provided (e.g. horizontal directional drilling or thrust boring). This description will identify how continued operations, safety and operational integrity of the rail network are maintained.

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

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

Mitigation strategies must include:

- consideration of any transport authority's works program and forward planning;

- proposed construction plans of all required transport infrastructure works in accordance with relevant and accepted authority standards and practices;
- the responsible parties for any works;
- estimates of costs;
- details on the timing of the works; and
- a summary of relevant approvals and legislative requirements needed to implement mitigation strategies and transport infrastructure works required by the project.

4.4 Waste

This section should complement other sections of part 4 of the EIS by providing technical details of waste treatment and minimisation, with proposed emission, discharge and disposal criteria, while other sections describe how those emissions, discharges and disposals would impact on the relevant environmental values. The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EM plan.

4.4.1 Description of environmental values

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

4.4.2 Potential impacts and mitigation measures

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

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

As part of the description, and unless issues related to excavated waste have been addressed in section 4.2 (in which case reference should be made to the appropriate subsection), this section should provide details of each waste in terms of:

- operational handling and fate of all wastes including storage;
- methods of disposal (including the need to transport wastes off-site for disposal) proposed to be used for any trade wastes, liquid wastes and solid wastes;
- hazards associated with the handling and storage of wastes;
- the potential level of impact on environmental values;
- proposed discharge/disposal criteria for liquid and solid wastes;
- design criteria to be used to ensure that waste containment and/or storage facilities perform satisfactorily;
- market demand for recyclable waste (where appropriate) should be addressed;
- waste minimisation techniques processes proposed; and
- decommissioning of the site.

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

4.5 Water resources

4.5.1 Description of environmental values

This section describes the existing environment for water resources that may be affected by the proposal in the context of environmental values as defined or considered in such documents as the *Environmental Protection Act 1994*, Environmental Protection (Water) Policy 1997 (EPP(Water)), ANZECC and ARMCANZ 2000, the National Water Quality Management Strategy (NWQMS), the DERM Guideline: *Establishing draft environmental values and water quality objectives* and the *Queensland Water Quality Guidelines 2006*, *Fisheries Act 1994*, *Water Act 2000*, the Water Resource (Fitzroy Basin) Plan 1999 and associated Resource Operations Plan, the Water Resource (Condamine-Balonne) Plan 2004 and associated Resource Operations Plan, the Water Resource (Calliope River Basin) Plan 2006 and associated Resource Operations Plan, and the Water Resource (Great Artesian basin) Plan 2006 and associated Resource Operations Plan. The definition of waters in the EPP(Water) includes the bed and banks of waters, so this section should address benthic sediments as well as the water column.

4.5.1.1 Surface waterways

A description should be given of the permanent, semi-permanent and ephemeral surface watercourses (including wetlands) and their quality and quantity in the area affected by the proposal with an outline of the significance of these waters to the river catchment system in which they occur. Details provided should include a description of existing surface drainage patterns, and flows in major streams and wetlands. Also provide details of the likelihood of flooding, history of flooding including extent, levels and frequency, and a description of present and potential water uses downstream of the areas affected by the proposal. Flood studies should include a range of annual exceedance probabilities for affected waterways, based on observed data if available or use appropriate modelling techniques and conservative assumptions if there are no suitable observations.

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

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

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

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

- values identified in the Environmental Protection (Water) Policy 1997;
- sustainability, including both quality and quantity;
- physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form; and
- any water resource plans, land and water management plans relevant to the affected catchment.

4.5.1.2 Groundwater

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

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

- geology/stratigraphy - such as alluvium, volcanic, metamorphic;
- aquifer type - such as confined, unconfined; and
- depth to and thickness of the aquifers.
- the significance of the resource at a local and regional scale;
- depth to water level and seasonal changes in levels;

- groundwater flow directions (defined from water level contours);
- interaction with surface water;
- interaction with sea/salt water;
- possible sources of recharge; and
- vulnerability to pollution.

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

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

4.5.2 Potential impacts and mitigation measures

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

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

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

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

Key water management strategy objectives include:

- protection of the integrity of the marine environment, and ultimately the Great Barrier Reef Marine Park and World Heritage property;
- protection of important local aquifers and protection of their waters;
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota and the littoral zone); and
- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the project.

4.5.2.1 Surface water and water courses

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

The hydrological impacts of the proposal should be assessed, particularly with regard to: stream diversions (whether temporary or permanent); water course crossings; scouring and erosion; and changes to flooding levels and frequencies both upstream and downstream of the project. The construction method for each major water course crossing should be identified and described.

Quality characteristics discussed should be those appropriate to the downstream and upstream water uses that may be affected. Chemical and physical properties of any waste water (including concentrations of

constituents) at the point of entering natural surface waters should be discussed along with toxicity of effluent constituents to flora and fauna.

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

The need or otherwise for licensing of any dams (including referable dams) or creek diversions, under the *Water Act 2000* or the construction or raising of any waterway barrier works under the *Fisheries Act 1994* should be discussed. Water allocation and water sources should be established in consultation with the DERM.

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

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

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

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

Where it is proposed that creeks will be diverted, the EIS should detail how rehabilitation will affect both the physical and ecological condition of the creek's bed and banks and the quality of water in it. Furthermore, the EIS should describe the monitoring that will be undertaken after decommissioning, and who will have responsibility for management measures and corrective action, to ensure that rehabilitated creeks do not degrade.

4.5.2.2 Groundwater

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

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

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

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

4.6 Air

4.6.1 Description of environmental values

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

A description of the existing air shed environment should be provided having regard for particulates and gaseous and odorous compounds. The EIS should discuss the background levels and sources of suspended particulates and any other relevant constituent, whether major or minor, of the air environment that may be affected by the proposal.

4.6.1.1 Greenhouse gas emissions

This section of the EIS should:

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

The Australian Department of Climate Change's *National Greenhouse Accounts (NGA) Factors* (available via the internet) can be used as a reference source for emission estimates and supplemented by other sources where practicable and appropriate.

4.6.2 Potential impacts and mitigation measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values for air, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed. Information should be submitted on the use of new technologies to reduce air emissions from the emission sources.

The objectives for air emissions should be stated in respect of relevant standards, relevant emission guidelines, and any relevant legislation.

The assessment of the proposal's impact on air quality should include at least the following matters:

- A description of the pollution control equipment and pollution control techniques to be employed on the premises and the features of the proposal designed to suppress or minimise emissions, including dusts and odours.
- A description of the back up measures to be incorporated that will act in the event of failure of primary measures to minimise the likelihood of adverse air impacts.
- Provide an air emission inventory of the proposed site for all potential point, line, area and volume sources including fugitive emissions.
- The proposed level of emissions must be compared with the best practice national and international source emission standards.
- Evaluate the cumulative impacts of the proposed emissions on the receiving environment by considering the project in conjunction with existing and known likely future emission sources within the region. Describe air shed management and the contribution of the proposal to air shed capacity in view of existing and future users of the air shed for assimilation and dispersion of emissions
- Identify 'worst case' emissions that may occur.
- If odour is an issue, conduct odour impact assessment using the criteria described in the DERM Guideline *Odour Impact Assessment from Developments*. The guideline sets out various approaches to assess potential impacts from developments proposals. Guidance provides the use of air dispersion modelling as a tool to predict ground level odour concentrations and comparison must be made with guideline values to determine the likelihood of adverse odour impacts.
- Air quality concentrations at the most exposed existing or likely future off-site sensitive receptors must be compared with the appropriate national and international ambient air quality standards including the Environmental Protection (Air) Policy 2008 and the National Environmental Protection Council (Ambient Air Quality) Measure.
- For the assessment of chemical species not listed in EPP (Air), the design criteria prescribed by the Victorian Government State Environment Protection Policy (Air Quality Management, 2001), based on odour or toxicity classification could be utilised. The human health risk associated with emissions from the facility of all hazardous or toxic pollutants should be assessed whether they are or are not covered by the National Environmental Protection Council (Ambient Air Quality) Measure or the Environmental Protection (Air) Policy 2008.

- For any proposal that does not meet the Environmental Protection (Air) Policy 2008 air quality objectives, the proponent may undertake a risk assessment to demonstrate that there will be no adverse impact off site. Risk management strategies also need to be developed that identify options that will reduce exposure of local communities to levels of indicators that may be of concern and how to meet the objectives of Environmental Protection (Air) Policy 2008 progressively over the long-term.

4.6.2.1 Greenhouse gas abatement

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

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

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

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

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

- carbon sequestration at nearby or remote locations above ground by such means as planting trees and other vegetation to achieve greater biomass than that cleared for the project; and
- carbon trading through recognised markets.

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

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

4.6.2.2 Climate change adaptation

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

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

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

4.7 Noise and vibration

4.7.1 Description of environmental values

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

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

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

4.7.2 Potential impacts and mitigation measures

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

Information should be submitted based on the proposed generation of construction related noise. Proposed measures for the minimisation or elimination of impacts should be provided. A discussion should be provided of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise.

Information should be supplied on blasting which might cause ground vibration or fly rock on, or adjacent to, the site with particular attention given to places of work, residence, recreation, worship and general amenity. The magnitude, duration and frequency of any vibration should be discussed. A discussion should be provided of measures to prevent or minimise environmental nuisance and harm. Reference should be made to the DERM Guideline: *Noise and vibration from blasting.*

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

4.8 Nature conservation

4.8.1 Description of environmental values

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

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

- integrity of ecological processes, including habitats of rare and threatened species;
- conservation of resources;

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

A discussion should be presented on the nature conservation values of the areas likely to be affected by the proposal. The flora and fauna communities which are rare or threatened, environmentally sensitive localities including marine environments, waterways (including wetlands), riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and habitat corridors should be described. The discussion should address the taking of native plants and impacts on animal breeding places as a result of the pipeline. The description should include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and state perspective. The description should indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) produced by the DERM (e.g. see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006).

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

The EIS should identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change. Areas of special sensitivity include wetlands, wildlife breeding or roosting areas, any significant habitat or relevant bird flight paths for migratory species, bat roosting and breeding caves including existing structures such as adits and shafts, and habitat of threatened plants, animals and communities. Proposal proximity to any biologically sensitive areas and any proposed construction buffers should be described.

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

- important habitats of species listed under the *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* as presumed extinct, endangered, vulnerable or rare;
- regional ecosystems listed as 'endangered' or 'of concern' under State legislation, and/or ecosystems listed as presumed extinct, endangered or vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- good representative examples of remnant regional ecosystems or regional ecosystems which are described as having 'medium' or 'low' representation in the protected area estate as defined in the Regional Ecosystem Description Database (REDD) available at the DERM's website;
- sites listed under international treaties such as Ramsar wetlands and World Heritage areas;
- sites containing near threatened species or essential, viable habitat for near threatened species;
- sites in, or adjacent to, areas containing important resting, feeding or breeding sites for migratory species of conservation concern listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (JAMBA) and between Australia and China (CAMBA) or Australia and the Republic of Korea (ROKAMBA);
- sites containing common species which are of scientific value or which contains feeding, breeding, resting areas for populations of echidna, koala, platypus and other species of special cultural significance;
- sites containing high biodiversity that are of a suitable size or with connectivity to corridors/protected areas to ensure survival in the longer term; such land may contain:
  - natural vegetation in good condition or other habitat in good condition (e.g. wetlands); and/or
  - degraded vegetation or other habitats that still supports high levels of biodiversity or acts as an important corridor for maintaining high levels of biodiversity in the area;
- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism;

- ecosystems which provide important ecological functions such as: wetlands of national, state and regional significance; tidal fish habitats; coral reefs; riparian vegetation; important buffer to a protected area or important habitat corridor between areas;
- protected areas which have been proclaimed under the *Nature Conservation Act 1992* and *Marine Parks Act 1982* or are under consideration for proclamation;
- areas of major interest, or critical habitat declared under the *Nature Conservation Act 1992* or high nature conservation value areas or areas vulnerable to land degradation under the *Vegetation Management Act 1999*; and/or
- impacts to animal breeding places and habitat fragmentation.

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

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

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

Key flora and fauna indicators should be identified for future ongoing monitoring.

4.8.1.1 Terrestrial flora

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

The existence of important local and regional weed species should also be discussed.

Vegetation mapping should provided along the pipeline route. Mapping should also illustrate any larger scale interconnections between areas of remnant or regrowth vegetation where the project site includes a corridor connecting those other areas.

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

- Location and extent of ecosystems listed as 'endangered', 'of concern' and 'not of concern' under State legislation, non-remnant vegetation on State Lands, and endangered regrowth vegetation subject to the current moratorium;
- Location and extent of ecosystems listed as presumed extinct, endangered, critically endangered or vulnerable under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*;
- location and extent of vegetation types using the DERM's regional ecosystem type descriptions in accordance with the REDD;
- location of vegetation types of conservation significance based on DERM's regional ecosystem types and occurrence of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 2006 and any subsequent amendments, as well as areas subject to the *Vegetation Management Act 1999*;
- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (national parks, conservation parks, resource reserves, nature refuges);
- any plant communities of cultural, commercial or recreational significance should be identified; and
- location and abundance of any exotic or weed species.

For a cross-section of each natural vegetation community likely to be significantly impacted by the Project, vegetation surveys should be undertaken and should include consideration of seasonality. Surveys should be conducted as follows:

- data shall be recorded using the Queensland Herbarium *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland* (DERM, 2005);
- a list of species present at representative sites covering the Project location should be recorded;
- the relative abundance of plant species present should be recorded;
- any plant species of conservation, cultural, commercial or recreational significance should be identified; and
- vegetation mapping and data should be submitted to the Queensland Herbarium to assist the updating of the CORVEG database if applicable

Specimens of species listed as protected plants under the Nature Conservation (Wildlife) Regulation 1994, other than common species, are to be submitted to the Queensland Herbarium for identification and entry into the HERBRECS database.

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

4.8.1.2 Terrestrial fauna

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

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

A representative vertebrate fauna survey combining intensive and broadscale survey techniques should be undertaken of the project area. This should be completed at a sampling intensity that provides a sufficient sample of local fauna species to inform an assessment of the likelihood of faunal occurrence based on habitat type and vegetation typology along the pipeline route. Apart from the species recorded in the survey, an indicative list of all known and potential species and threatened species in the project area should be provided, by reference to the regional ecosystems within the project area and a 10km buffer, and knowledge of species present in the local bioregion. The occurrence of fauna of conservation significance should be defined in tabulated form or geocoded to mapped vegetation units or habitats, which can then be used in section 4.9.2 to propose areas to be protected.

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

4.8.1.3 Aquatic biology

The aquatic flora and fauna occurring in the areas affected by the proposal should be described, noting the patterns and distribution in the waterways and any associated wetlands and lacustrine environments.

4.8.2 Potential impacts and mitigation measures

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

The EIS should address any actions of the project or likely impacts that require an authority under the *Nature Conservation Act 1992*, and/or *Fisheries Act 1994*; and/or would be assessable development for the purposes of the *Vegetation Management Act 1999*.

The discussion should cover all likely direct and indirect environmental harm due to the project on flora and fauna particularly sensitive areas. Terrestrial and aquatic (freshwater) environments should also be covered.

Strategies for protecting the Great Barrier Reef Marine Park and World Heritage Property, and any rare or threatened species should be described, and any obligations imposed by State or Commonwealth legislation or policy or international treaty obligations (i.e. JAMBA, CAMBA or ROKAMBA) should be discussed. Emphasis should be given to potential environmental harm to benthic and inter-tidal communities including, but not limited to, seagrass beds, saltmarsh and mangroves.

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

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

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

The EIS should propose and describe in detail measures to be taken to avoid and minimise potential adverse impacts of the proposal on nature conservation and biodiversity values. Any potential net loss of environmental values should be identified and quantified. Environmental offsets should be described that would counterbalance the unavoidable, negative environmental impacts that cannot be reduced, minimised or mitigated. Proposed environmental offsets should be consistent with the requirements set out in the specific-issue offset policies under the framework of the Queensland Government's *Environmental Offset Policy (2008)*.

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

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

Strategies to address habitat fragmentation impacts to animals and animal breeding places, for both arboreal and ground dwelling should be discussed. This should include genetic separation and proposed mitigation measures.

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

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

Relevant specific-issue policies that should be addressed are:

- Koala habitat – *Offsets for Net Benefit to Koalas and Koala Habitat*, 2006, Environmental Protection Agency; and
- Offsets framework – Queensland Government's *Environmental Offset Policy (2008)*.

Where the rehabilitation outcome of the EIS includes native vegetation, local indigenous species should be sourced from a local seed bank.

Reference sites for monitoring rehabilitation should be established. There should be at least two for each ecosystem type to be rehabilitated. This will provide benchmarks against which to measure progress and success of rehabilitation

4.9 Cultural heritage

4.9.1 Description of environmental values

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

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

An historical cultural heritage study should also be undertaken of the known and potential historical cultural heritage values of the affected area. The study will, as a minimum, include a desktop analysis and an archaeological investigation (i.e. a physical investigation) of the area potentially affected by the project. In the event that the study area includes any site listed on the heritage register, or a site is located within 1 km on either side of the proposed pipeline alignment, a more detailed field assessment should be undertaken.

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

- the Queensland Heritage Register, for places already protected under the *Queensland Heritage Act 1992*;
- local government heritage registers, lists or inventories;
- the results of previous cultural heritage studies conducted within the region of the project; and
- any existing literature relating to the affected area.

The scope of the archaeological investigation should be based upon the results of the desktop analysis. The archaeological investigation is to be conducted by an appropriately qualified person, as required by the *Queensland Heritage Act 1992*, and should address all types of historical cultural heritage places located within the project area (i.e. built, archaeological and cultural landscape values).

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

4.9.2 Potential impacts and mitigation measures

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

4.9.2.1 Indigenous cultural heritage

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

4.9.2.2 Non-indigenous historical cultural heritage

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

If one is required, the development of a historical heritage management plan should be negotiated with the lead agency (the Cultural Heritage Branch, DERM) and any other relevant stakeholders.

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

- Processes for the mitigation, management and protection of identified historical cultural heritage values during excavations of the construction, operational, rehabilitation and decommissioning phases of the project;
- Processes for reporting, as required by section 89 of the *Queensland Heritage Act 1*992, the discovery of any archaeological artefact not previously identified in the historical cultural heritage study;
- Procedures for the collection of any artefact material, including appropriate storage and conservation;
- Historical cultural heritage awareness training or programs for project staff; and

The historical heritage management plan should be incorporated into the project's draft EM plan.

4.10 Social

4.10.1 Description of environmental values

This section should profile the existing social values and characteristics of communities, groups and individuals likely to be impacted by the proposal. Describe the social values for the affected communities and populations in terms of the: integrity of social conditions; including amenity and liveability; harmony and well being; sense of community; access to recreation; and access to social and community services and infrastructure. The EIS should describe the social amenity of any areas that will be directly affected by the proposal. In this instance consideration should be given to:

- *The population and demographics of the affected communities:* The description should address the communities likely to be impacted directly and indirectly by the project. Characteristics to be described may include the community size, age, structure, gender composition, education level, residency, labour force, average income profile, the number and proportion of low income households, household size, health and wellbeing indicators and employment rates in the community, as well as additional information identified as relevant thorough consultation with affected and interested persons;
- Explore, the distribution and nature of disadvantage in the project area;
- Community infrastructure and services, access and mobility;
- Recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;
- On farm activities affected by the proposal; and
- Source communities for the proposed workforce.

This section of the EIS should also describe the community engagement process and present its findings to date.

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

4.10.2 Potential impacts and mitigation measures

This section defines and describes:

- the adverse and beneficial impacts of the project on social values;
- objectives and practical measures for protecting or enhancing social values; and
- how the achievement of the objectives will be monitored, audited and managed.

The social impact assessment of the project is to be carried out in consultation with affected local authorities and relevant State authorities, such as the: Department of Infrastructure and Planning; Department of Communities; Department of Employment, Economic Development and Innovation; Department of Health; and Department of Education and Training

The assessment of impacts should describe the likely response of all affected communities, including indigenous communities, in the immediate and longer timeframes, and cumulatively with the impacts of other known existing and planned projects. These impacts should be considered both at the local and regional level. The assessment should also describe the potential beneficial and detrimental impacts on these communities.

The nature and extent of the community consultation program are to be described and a summary of the results incorporated in the EIS, with a description of how consultation feedback has identified and informed the assessment of impacts and development of mitigation measures.

The social impact assessment should include sufficient information to enable affected local authorities and State authorities to make informed decisions about how the proposal may affect their business and plan for the continuing provision of community services, recreational activities and other services in the region.

In particular, this section of the EIS should address the following matters:

- The sufficiency of relevant infrastructure and services to meet expected demands and outline any detrimental or beneficial impacts of the proposal in relation to these matters;
- The number of personnel to be employed, the skills base of the required workforce and the likely sources (i.e. local, regional or other) for the workforce during the construction and operational phases for each aspect of the project and initiatives for local employment opportunities; and
- Investigate, initiate and or contribute towards strategies to address any disparity, such as training and employment schemes for people from disadvantaged backgrounds;
- Investigate the possible economic, social and cultural mitigation measures to offset any impact of the relatively large injection of non-residents on small and isolated communities along the path of the pipeline;
- The EIS should address impacts of construction. This section of the EIS should discuss the capability of the existing housing stock, including rental accommodation, to meet any additional demands created by the project.

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

For identified impacts on social values, the EIS should develop mitigation and enhancement measures and facilitate negotiations towards acceptance of these measures with affected communities. The EIS should develop an accommodation strategy, developed in consultation with relevant State government agencies, which will detail proposals that avoid, mitigate or offset any short and medium term adverse effects on the local housing market.

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

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

4.11 Health and safety

4.11.1 Description of environmental values

This section describes the existing community values for public health and safety that may be affected by the proposal.

4.11.2 Potential impacts and mitigation measures

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

The EIS should undertake a high level Safety Management Study in accordance with the requirements of AS2885.1:2007 to determine potential threats to the integrity of the pipeline and the management of these threats. This should include discussion of how construction in an existing operating pipeline corridor will be managed.

Map(s) should be provided showing the locations of sensitive receptors, such as, but not necessarily limited to, kindergartens, schools, hospitals, aged care facilities, residential areas, and centres of work (e.g. office buildings, factories and workshops).

4.12 Economy

4.12.1 Description of environmental values

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

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

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

4.12.2 Potential impacts and mitigation measures

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

The general economic benefits from the project should be described.

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

- the significance of this proposal on the local and regional economic context;
- the long and short-term beneficial (e.g. job creation) and adverse (e.g. competition with local small business) impacts that are likely to result from the development;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);
- the distributional effects of the proposal including proposals to mitigate any negative impact on disadvantaged groups; and
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future.

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

For identified impacts to economic values, suggest mitigation and enhancement strategies and facilitate initial negotiations towards acceptance of these strategies.

4.13 Hazard and risk

This section of the EIS should describe the potential hazards and risk to people and property that may be associated with the proposal as distinct from hazards and risk to the natural environment, which should be

addressed in other sections of the TOR. When addressing natural hazards, particularly in regard to places where people would work and live (such as a mine's accommodation camp), the EIS should consider the principles of natural hazard management in State Planning Policy 1/03 (SPP1/03), *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, even if the development is exempt development under the *Integrated Planning Act 1997*. SPP1/03 may not be applicable as a statutory instrument for exempt development, but it contains information that guides best practice for all development.

4.13.1 Description of environmental values

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

4.13.2 Potential impacts and mitigation measures

This section of the EIS should describe the potential hazards and risk that may be associated with the proposal, including consideration of both natural and man-made hazards. This section should also define and describe the objectives and practical measures for protecting people and places from hazards and risk, describe how nominated quantitative standards and indicators may be achieved for hazard and risk management, and how the achievement of the objectives will be monitored, audited and managed.

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

The proponent should develop an integrated risk management plan for the whole of the life of the project including construction, operation and decommissioning phases. The plan should include a preliminary hazard analysis (PHA), conducted in accordance with appropriate guidelines for hazard analysis (e.g. HAZOP Guidelines, NSW Department of Urban Affairs and Planning (DUAP)). The assessment should outline the implications for and the impact on the surrounding land uses, and should involve consultation with Department of Community Safety. The preliminary hazard analysis should incorporate:

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

The integrated risk management plan should include the following components:

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

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

4.14 Cross-reference with the terms of reference

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

5 Environmental management plan

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

The EM plan is an integral part of the EIS, but should be capable of being read as a stand-alone document without reference to other parts of the EIS. For a petroleum project the EM plan must meet the content requirements of section 310D of the *Environmental Protection Act 1994*. The general contents of the EM plan should comprise:

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

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

6 Commitments not included in the EM plan

In circumstances where the proponent has made commitments that are not included in the EM plan (such as a commitment to assist a local council mitigate social impacts), this section of the EIS should summarise those commitments. It should be clear how and when the commitment will be fulfilled.

7 References

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

8 Recommended appendices

A1. Final terms of reference for this EIS

A copy of the final TOR should be included in the EIS. Where it is intended to bind appendices in a separate volume from the main body of the EIS, the TOR at least should be bound with the main body of the EIS for ease of cross-referencing. A summary, cross-referencing specific items of the TOR to the relevant section of the EIS, should also be provided in Section 4.15 of the EIS. For this purpose the TOR should be line numbered.

A2. Approvals

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

A3. Study team

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

A4. The standard criteria

A brief summary should be presented of the proposal's compatibility with the standard criteria as defined by the *Environmental Protection Act 1994*, which include the principles of ESD and other relevant policy instruments.

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

A5. Consultation report

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

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

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

A6. Specialist studies

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

- pipeline route selection;
- geology;
- soil survey and land suitability studies;
- waterway hydrology;
- groundwater;
- flora and fauna studies;
- economic studies, cost benefit analysis; and
- hazard and risk studies.

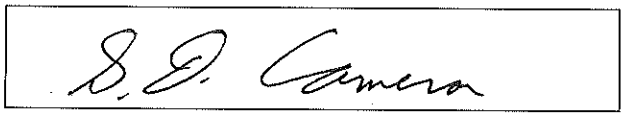
A7. Research

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

Disclaimer

While this document has been prepared with care, it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved By



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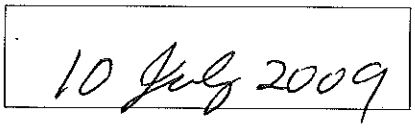

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