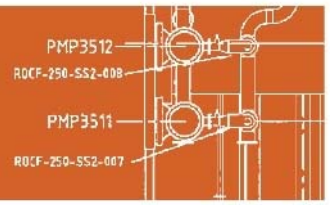

Water for Bowen Project

Terms of Reference for an Environmental Impact Statement

Under Part (4) of the Queensland *State Development and Public Works Organisation Act 1971*

November 2007

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Preface

The Water for Bowen project was declared to be a "significant project" under Section 26 of the Queensland *State Development and Public Works Organisation Act 1971* (*SDPWOA*) by the Coordinator-General (CG) on 1 December 2006. Matters considered by the CG in making this declaration included information in an Initial Advice Statement prepared by the proponent, the level of investment necessary for the project, employment opportunities provided by the project, potential impact on the environment, potential effects on relevant infrastructure and the significance of the project to the region and State. The declaration initiates the statutory environmental impact assessment procedure of Part 4 of this Act, which requires the proponent to prepare an Environmental Impact Statement (EIS) for the project.

The Department of Infrastructure is responsible for managing the environmental impact assessment process on behalf of the CG. The Department has invited relevant state and local government representatives and authorities to participate in the process as Advisory Agencies.

The first step in the impact assessment procedure is the development of a Terms of Reference (ToR) for the preparation of an EIS. The process involves the formulation of a draft ToR which is made available for public and government agency comment. The CG has regard to all comments received on the draft ToR in finalising the ToR, which will be presented to the proponent.

The statutory impact assessment process under the *SDPWOA* is also the subject of a bilateral agreement between the Queensland and the Commonwealth Governments in relation to environmental assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act).* The proponents referred the Project to the Commonwealth Minister for the Environment and Water Resources in accordance with the provisions of the *EPBC Act*. The Commonwealth Minister decided, on 16 October 2006, that the Project did constitute a controlled action under Section 75 of the *EPBC Act*, with the controlling provisions being world heritage (sections 12 and 15A), listed threatened species and communities (sections 18 and 18A), and listed migratory species (sections 20 and 20A).

However, it should be noted that the Commonwealth Minister will undertake a separate approval process following release of the CG's Report. The Minister will then grant, or withhold, approval for the controlled action under section 133 of the EPBC Act. The Minister may attach conditions to the approval, in addition to those set by the CG, to mitigate impacts on matters of National Environmental Significance (NES).

The proponent will prepare an EIS to address the ToR. Once the EIS has been prepared to the satisfaction of the CG, a public notice is advertised in relevant newspapers circulating in the district and the State. The notice will state: where copies of the EIS are available for inspection and how it can be purchased; that submissions may be made to the CG about the EIS; and the submission period. The proponent may be required to prepare a Supplementary Report to the EIS to address specific matters raised in submissions on the EIS.

At the completion of the EIS phase, the CG will prepare a report evaluating the EIS and other related material, pursuant to Section 35 of *SDPWOA*. The CG report will include an evaluation of the environmental effects of the proposed project and any related matters. The CG report will reach a conclusion about the environmental effects and any associated mitigation measures, taking into account all of the relevant material including: the EIS; all properly made submissions and other submissions accepted by the CG; and any other material the CG considers is relevant to the project, such as a Supplementary Report to the EIS, comments and advice from Advisory Agencies, technical reports on specific components of the project and legal advice.

The Project involves development that would require an application for development approval for material change of use and/or impact assessment under the *Integrated Planning Act 1997* (*IPA*). Consequently, the CG report may, under s.39 of *SDPWOA*, state for the assessment manager one or more of the following:

- the conditions that must attach to the development approval;
- that the development approval must be for part only of the development; and/or
- that the approval must be preliminary approval only.

Alternatively the CG report must state for the assessment manager –

- that there are no conditions or requirements for the project; or
- that the application for development approval be refused.

Further, the CG report must:

- give reasons for the statements (above); and
- be given to the assessment manager by the CG.

Further to the above *IPA* approvals, other approvals under a range of legislation including, but not limited to the *Integrated Planning Act 1997, Environmental Protection Act 1994, Water Act 2000 and the Vegetation Management Act 1999* are likely to be required.

These ToR provide information in two broad categories:

- Part A – Information and advice on the preparation of the EIS.
- Part B – Content of the EIS.

For further inquiries about the EIS process for the project, please contact:

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Abbreviations

The following abbreviations have been used in this document:

AHD	Australian Height Datum
BPA	Biodiversity Planning Assessment
CAMBA	China-Australia Migratory Bird Agreement
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CG	The Coordinator General of the State of Queensland
DEWR	Commonwealth Department of the Environment and Water Resources
DMR	Department of Main Roads
DNRW	Department of Natural Resources and Water
DPIF	Department of Primary Industries and Fisheries
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Register
EP Act	*Environmental Protection Act 1994* (Qld)
EPA	Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPP Air	Environmental Protection (Air) Policy 1997
EPP Noise	Environmental Protection (Noise) Policy 1997
EPP Waste	Environmental Protection (Waste Management) Policy 2000
EPP Water	Environmental Protection (Water) Policy 1997
EPR Waste	Environmental Protection (Waste Management) Regulation 2000
ERA	Environmentally Relevant Activity
ESD	Ecologically Sustainable Development
GQAL	Good Quality Agricultural Land
HAT	Highest Astronomical Tide
IAS	Initial Advice Statement
IDAS	Integrated Development Assessment System
ILUA	Indigenous Land Use Agreement
IPA	*Integrated Planning Act 1997* (Qld)
JAMBA	Japan-Australia Migratory Bird Agreement
NCA	*Nature Conservation Act 1992*
NES	National Environmental Significance as defined by the EPBC Act
NTRB	Native Title Representative Bodies
PHA	Preliminary Hazard Assessment
QH	Queensland Herbarium
QH Act	*Queensland Heritage Act 1992*
QHC	Queensland Heritage Council
ROW	Right-of-way
SDPWO Act	*State Development and Public Works Organisation Act 1971*
ToR	Terms of Reference as described in Part 4 of the SDPWO Act
VMA	*Vegetation Management Act 1999* (Qld)
WRP	Water Resource Plan

Part A – Information and Advice on the preparation of the EIS

Project proponent

The proposed Water for Bowen Project would be built and operated by SunWater, a Queensland Government owned corporation which constructs, owns and operates water supply infrastructure throughout Queensland.

Project description

SunWater is investigating the feasibility of the Water for Bowen Project, which aims to supply water for urban, industrial and agricultural uses via a new water transport system extending from the Burdekin River across the coastal plain to Bowen and surrounding areas. The project will provide up to 60,000 ML per annum from existing allocations in the Burdekin Falls Dam.

The water transport system comprises approximately 150 kilometres of open channel (which includes the existing 12.7 kilometre Elliot Main Channel), a lateral pipeline to Abbot Point, reticulated pipelines, two pump stations and a balancing storage.

The proposed water transport infrastructure corridor is located near the major townships of Bowen, Home Hill and Ayr within Bowen and Burdekin Shires. The proposed corridor extends from the end of the existing Elliot Main Channel, runs in a northerly direction and then traverses through a saddle in Stokes Range. Beyond Stokes Range the channel will proceed south-east parallel to the Bruce Highway to Rocky Ponds Creek. From this point the proposed corridor crosses country to the Elliot River then passes through the saddle near Mount Greentop, before crossing the valley to the Don River.

The study area includes the channel and pipeline corridor extending from the existing Elliot Main Channel to the Don River and the potential benefited areas of Inkerman, Molongle, Salisbury Plains West and East, Summer Hill, Abbot Point and Bowen.

The Queensland Government has requested that SunWater investigate the feasibility of a further 50 kilometre pipeline link from the Water for Bowen project to secure water supplies for Proserpine and the Whitsundays. The Proserpine extension will be assessed through a separate approval process.

SunWater has prepared an Initial Advice Statement (IAS) which provides further detail relating to the Water for Bowen Project.

Purpose of the Terms of Reference

These ToR essentially outline the issues that must be considered in preparing the EIS. Furthermore, the ToR provides the framework for the EIS, including information on the purpose and role of the EIS and the factors considered to be most significant for the proposal. It indicates the types of studies and the data that should be provided in the EIS. All potentially significant impacts of the proposed development on the environment are to be investigated, and requirements for the mitigation of any adverse impacts are to be detailed in the EIS. Any prudent and feasible alternatives should be discussed and treated in sufficient detail. The reasons for selection of the preferred option should be clearly identified. The nature and level of investigations should be relative to the likely extent and gravity of impacts. These guidelines should, however, not be interpreted as excluding from consideration any matters which are currently unforeseen, which may arise during ongoing scientific studies or which may arise from any changes in the nature of the proposal during the preparation of the EIS, the community consultation process and associated documentation.

The EIS should address at least the requirements as set out in these ToR. However, it must be noted that the EIS must address those matters as set out in Schedule 1 of the *State Development and Public Works Organisation Regulations 1999* and Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000*.

EIS guidelines

The objective of the EIS is to identify potential environmental impacts and to ensure that those impacts are avoided where possible. Where unavoidable, impacts must be examined fully and addressed so that the development is based on sound environmental protection and management criteria with consideration of compensationary or offset options explored.

The scope of the EIS is to include the study area, including the potential material extraction and disposal sites, for all relevant aspects of investigations except in cases where the necessary development permits or licences are in

place and will remain valid over the required time period(s). The scope does not include activities within potentially benefited areas that are subject to separate approvals processes unless specifically required for assessment against the *Environment Protection and Biodiversity Conservation Act 1999* (refer to Part B section 1.7).

The EIS process followed will be as specified in the *State Development and Public Works Organisation Act 1971* (and Regulation) and meet Commonwealth regulations as specified in the *Environment Protection and Biodiversity Conservation Act 1999.*

An EIS should provide:

- a description of the relevant aspects of the existing social, economic, natural and built environment;
- a description of the development proposal and means of achieving the development objectives;
- definition and analysis of the likely impacts of the development on the environment;
- a description of the type of data used for providing baseline information to predict impacts of the development and associated activities, and for benchmarking future monitoring programs as part of an EMP;
- a framework against which Government decision-makers can consider the environmental aspects of the proposal and set conditions for approval to ensure environmentally sound development;
- a definition of all significant impacts and a consolidated list of measures proposed to mitigate adverse effects; and
- recommendations on the need for and contents of any environmental management plans and/or operational plans to mitigate adverse effects.

EIS objectives and key issues

Objectives

The objectives of the EIS are as follows:

- to provide information on the proposal and development process to the community and decision makers;
- to comprehensively identify and evaluate all relevant issues associated with the proposal;
- to identify all potential environmental, cultural, social, transport and land use planning impacts of the preferred concept, and recommend infrastructure and facilities needs together with other design and operational measures required to minimise or compensate for adverse impacts and enhance benefits;
- to engage with the community and relevant stakeholders in the process of identifying, assessing and responding to the impacts of the proposal;
- to identify all necessary licences, planning and environmental approvals including approval requirements pursuant to the *Environment Protection and Biodiversity Conservation Act 1999, Integrated Planning Act 1997, Environmental Protection Act 1994, Water Act 2000, Vegetation Management Act 1999, Nature Conservation Act 1992, Aboriginal and Cultural Heritage Act 2003* and other legislation and the Burdekin Shire and Bowen Shire Planning Schemes; and
- to provide an input to the decision-making process, assisting with the determination of whether to accept or modify the proposal, approve it with conditions or carry out further studies.

Key issues

The issues to be addressed as part of the EIS can be divided into the following categories:

- detailed project description;
- project justification and alternatives;
- impacts on surrounding land uses and land use planning;
- impacts on infrastructure in the area;
- impacts on the coastal environment including water quality;
- impacts on areas of cultural heritage value and / or indigenous significance;
- soil and geology issues including land capability/suitability;

- impacts on terrestrial and freshwater aquatic biodiversity;
- impacts on surface and groundwater hydrology;
- impacts of noise and vibration;
- economic effects, including impacts and benefits on local and regional businesses;
- social issues and opportunities;
- safety and emergency; and
- waste management.

The EIS will be required to consider in detail relevant issues under each of these categories and all other impacts on the physical and social environment. The information required is described in the following sections.

Public consultation on Terms of Reference

The draft ToR was publicly notified in *The Bowen Independent*, *The Home Hill Observer, The Townsville Bulletin, The Courier-Mail* and *The Australian* newspapers and the Department's website inviting comment over the period from 19 May to 19 June 2007.

Eight responses were received from Government agencies and four responses were received from public and interest groups. All relevant comments have been incorporated into this document.

**** The term environment refers to:***

a) ecosystems and their constituent parts, including people and communities;

b) all natural and physical resources;

c) the qualities and characteristics of locations, places and areas, regardless of size, that stimulate biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community;

d) the social, economic, aesthetic and cultural conditions which influence, or are affected by, the entities and attributes mentioned in paragraphs (a) to (c); and

e) ***the local, regional, Queensland and Australian populations and labour markets.***

Part B - Content of the EIS

It is recommended that the environmental impact statement (EIS) follow the heading structure of these terms of reference (ToR) to facilitate cross-referencing.

Executive summary

The executive summary should be written as a stand alone document, able to be reproduced on request and distributed to interested parties who may not wish to read or purchase the EIS as a whole.

The structure of the executive summary should generally follow that of the EIS but focus on key issues to enable the reader to obtain a clear understanding of the Project and its potential adverse and beneficial environmental, social and economic impacts and the management measures to be implemented by the proponent to mitigate all residual impacts.

The executive summary must include:

- the title of the Project.
- name and contact details of the proponent, and a discussion of previous projects undertaken by the proponent and their commitment to effective environmental management.
- a concise statement of the aims and objectives of the Project.
- the legal framework, decision-making authorities and Advisory Bodies.
- an outline of the background to and need for the Project, including the consequences of not proceeding with the Project.
- an outline of the alternative options considered and reasons for the selection of the proposed development option.
- a brief description of the Project (pre-construction, construction and operational activities) and the existing environment, utilising visual aids where appropriate.
- an outline of the principal environmental impacts predicted and the proposed environmental management strategies (including waste minimisation and management) and commitments to minimise the significance of these impacts.

Glossary of terms

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

Table of contents

A table of contents should be provided.

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, whether the proponent is seeking only a preliminary approval through the Integrated Development Assessment System (IDAS) or a full approval with all permits). 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 proponents, including details of any joint venture partners.

1.2 Project description

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

A brief description should be provided of studies or surveys that have been undertaken for the purposes of developing the project and preparing the EIS. This should include reference to relevant baseline studies or investigations undertaken previously.

1.3 Project objectives and scope

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

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

1.4 The Environmental Impact Statement (EIS) process

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

1.4.1 Methodology of the EIS

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

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

1.4.2 Objectives of the EIS

Having described the 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 EM Plan.

When considering whether a potential impact may or may not be significant, the proponent should take account of both the intensity of the impact and the context in which it could occur. Both short term and long term relevant impacts must be assessed.

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 topics for inclusion in the project's draft environmental management plan (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 will be addressed and taken into account in the decision-making process.

1.5 Public consultation process

To facilitate the assessment process, the proponent is strongly encouraged to regularly consult with Advisory Agencies and other appropriate stakeholders throughout the EIS process. This should include consultation with relevant Indigenous traditional owner groups and the Indigenous community.

It is the responsibility of the proponent, in consultation with Advisory Agencies, to identify legislation, policies and methodologies relevant to the EIS process, and to determine appropriate parts of the community which should be consulted during the EIS preparation stage. It is recommended that an open community consultation process be carried out in addition to the legislated environmental impact assessment process. Copies of the draft EIS will be provided to all Advisory Agencies and on request to relevant individuals and peak groups with an interest in the project.

The public consultation program must provide opportunities for community involvement and education. It may include interviews with individuals, information sessions, key stakeholder briefings, 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 construction, ongoing operation and maintenance. Refer to the EPA guideline **"Issue Identification and Community Consultation"**.

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

This section should explain the legislation and policies controlling the approvals process. Reference should be made to the *Integrated Planning Act 1997* and other relevant Queensland laws particularly the *Environmental Protection Act 1994* and the *Water Act 2000*. Any requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* should also be included.

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

This information is required to assess how the legislation applies to the Project, which agencies have jurisdiction, and whether the proposed impact assessment process is appropriate. This section should also describe the legislative framework that would enable the allocation of water from the Project, with particular reference to the Burdekin WRP and the requirement for development of Land and Water Management Plans.

1.6.2 Planning processes and standards

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

1.7 Accredited process under the Bilateral Agreement with the Australian Government

This project is a controlled action under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In this regard, the Commonwealth has accredited the State's EIS process for the purposes of the Commonwealth's assessment under Part 8 of the EPBC Act.

When a State EIS process has been accredited, it is necessary for the terms of reference to address potential impacts on the matters of National Environmental Significance (NES) that have been identified in the 'controlling provisions' when the project was declared a controlled action. In this case the NES matters are as follows:

- sections 12 and 15A (World Heritage);
- sections 18 and 18A (Listed threatened species and communities); and
- sections 20 and 20A (Listed migratory species).

The matters of NES to be specifically addressed under the requirements of the *EPBC Act* are, but should not be limited to:

- sections 12 and 15A;
    - Great Barrier Reef World Heritage Area;
- sections 18 and 18A; and
- Sections 20 and 20A.

A stand-alone report addressing the matters of NES must be provided as an appendix to the EIS (see Appendix 7) that exclusively and fully addresses the issues relevant to the controlling provisions. This stand alone section should include:

A description of the affected environment relevant to the matters protected
It is important that the current status of the matters protected under the EPBC Act be described in sufficient detail, to inform the analysis of the Project's impact on these matters.

If the matters protected are the World Heritage values of a World Heritage property, the report should set out the World Heritage values that are potentially affected by the proposal within the wider context of the values of the property as a whole.

For (Australian Government) listed threatened species and communities and migratory species, the description of the environment should include:

- the species' current distribution;
- relevant information about the ecology of the species (habitat, feeding and breeding behaviour etc);
- information about any populations of the species or habitat for the species in the area affected by the proposed action;
- current pressures on the species, especially those in the area to be affected by the proposal; and
- relevant controls or planning regimes already in place.

Potential significant impacts on matters of National Environmental Significance (NES)
The following potential impacts may need to be addressed in the EIS. This section will focus on (but not be limited to) discussing potential impacts upon the semi-evergreen vine thicket, dugong, sea turtle, humpback whale and values of the Great Barrier Reef World Heritage Area. The impacts are provided as a guide for specific matters of NES. Not all of these headings will apply to all proposals and impacts specific to matters of NES will be discussed in section 8.7.

<u>Impact on the World Heritage values:</u>
- modify or inhibit ecological processes in a World Heritage property;
- reduce the diversity or modify the composition of plant and animal species in all or part of a World Heritage property;
- fragment, isolate or substantially damage habitat important for the conservation of biological diversity in a World Heritage property;

- cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property;
- fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property;
- substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons, or other pollutants or substances in a river, wetland or water body in a World Heritage property.

Impact on a listed threatened species:
Potential impacts vary depending on whether the species is extinct in the wild, endangered or vulnerable but are generally as follows:

- lead to long term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of the species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to the species becoming established;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

Impact on a listed ecological community:

- reduce the extent of an ecological community;
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- adversely affect habitat critical to the survival of an ecological community;
- modify or destroy abiotic- (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- cause a substantial change in the species composition for an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - assisting invasive species, that are harmful to the listed ecological community, to become established; or
    - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- interfere with the recovery of an ecological community.

Impact on a listed migratory species:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Assessment of relevant impacts and mitigation measures

In this section, the impacts and potential impacts on the matters protected should be described, and the possible mitigation measures for each impact need to be analysed. If alternative ways of taking the action have been identified, the relative impacts of these alternatives should also be considered.

When effective mitigation measures are not available, the discussion should be broadened to include compensatory measures to offset unavoidable impacts.

The discussion of impacts to the relevant matters protected should address all relevant impacts, and provide sufficient justification for all conclusions reached on specific impacts. In accordance with section 527E of the EPBC Act the proponent is required to address the relevant consequential impacts of secondary actions that are facilitated, to a major extent, by the project. This should include a discussion of potential industrial uses and

other new or expanded activities that would be contingent on the supply of water by the project. The assessment of secondary actions should cover the range of activities within the contemplation of the proponent or a reasonably foreseeable consequence of the secondary action. The assessment must be to a level of detail that would provide an adequate overview of potential consequential impacts. The level of adequacy will be determined as being enough information for the Commonwealth Minister for the Environment or their delegate to be able to make an informed decision on the likely consequential impacts caused as a result of the proposal.

The details of the source of water for the project should be provided along with a description of the potential impacts on matters of NES of extracting this water from the existing impoundment.

In some cases impacts may be relevant to more than one matter protected. For example when the species is listed as both a migratory and threatened species under the EPBC Act. In such cases the impacts may be addressed together, clearly stating the relevance of the impact to the different matters protected.

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.

An overall assessment of the need/demand for the various elements of the Project is required with regard to the following matters:

This section should describe:

- the justification for the Project in a regional, State and National context;
- strategic, economic, environmental and social implications of the proposal including future water consumption, production and supply security;
- economic and social benefits, including employment and spin-off business development;
- identification of customers (industrial, non-industrial and domestic) and potential customers for the water;
- the Project's technical feasibility and commercial viability including potential customers and target markets, immediate and long-term implications for the water transmission network; and
- the Project's compatibility with relevant State and Australian policies, including the COAG Water Reform Framework, the National Strategy for Ecologically Sustainable Development, National Strategy on Conservation of Australia's Biological Diversity, Reef Water Quality Protection Plan and with water reform principles under the National Competition Policy and the National Water Initiative.

2.2 Alternatives to the project

This section should describe feasible alternatives to the proposed Project, including the option of taking no action i.e. of not building the water transport system. Alternatives should be discussed in sufficient detail to enable an understanding of reasons for preferring certain options and courses of action and rejecting others. Reasons for selecting preferred options should be delineated in terms of technical, commercial, social and natural environment aspects, as applicable. In particular, the principles of ESD and sustainable development should be included. The alternatives considered could include:

- demand reduction techniques;
- other water sources and supply methods, including:
    - new water storages;
    - recycling;
    - desalination; and
    - groundwater.
- other pipeline/channel options, in particular include discussion of:
    - methodology such as, greater use of pipelines over open channel water delivery methods, and in particular the effects of different designs on matters of national environmental significance;

- alternative routes considered, aided by maps and diagrams with location options highlighting the preferred location shown on topographical maps at a suitable scale; and
- the rationale for selection of the preferred route and reasons other options were rejected.

3 Description of the project

The objective of this section is to describe all phases of the Project throughout its lifetime including planning, construction stages, commissioning and long term operation of the facility. The Project description also allows further assessment of which approvals may be required and how they may be managed through the life of the Project.

The various elements of the project should be described in the text and illustrated with maps, diagrams, engineering drawings (at a suitable scale) and artist's impressions, as required. Consideration should be given to providing a rectified air photo enlargement to illustrate components of the project in relation to the land and natural and built features of the area. The description should include, but may not be limited to:

- location of the Project site in relation to protected areas;
- proposed construction sequencing and methodology;
- proposed benefited areas including likely benefited activities that will potentially use the supplied water and estimates of associated water demand, including whether it represents additional water or a substitution for existing groundwater allocations; and
- location of the site in relation to the supporting local and state-controlled roads, complete with road names.

3.1 Ecological sustainable development

A summary of the Project's compatibility with Ecological Sustainable Development policy and other relevant policy instruments such as the standard criteria as defined by the *Environmental Protection Act 1994* and section 3 of the *Environment Protection and Biodiversity Conservation Act 1999* should be presented. Consideration should focus on The National Strategy for Ecologically Sustainable Development, published by the Commonwealth Government in December 1992 (available from the Australian Government Publishing Service). Each principle should be discussed and conclusions drawn as to how the Project conforms. A life-of-project perspective should be shown covering construction and operational activities.

3.2 Location

This section should describe the regional and local context of the water transport system and associated infrastructure and illustrated on maps at suitable scales.

The Project area, the area that would be directly impacted by the construction and operation of the water transport infrastructure, should be defined. Maps should show the precise location of the Project area, and in particular:

- the street addresses, location and boundaries of land tenures, in place or proposed, to which the Project area is, or will be, subject including real property descriptions; and
- the location of any proposed buffers surrounding the working areas (for construction) and around the water transport system.

The process and criteria used for the selection of the specific project route design should be described. These features should be overlain on a rectified air photo enlargement to illustrate components of the Project in relation to the natural and built features of the area.

The study area should also be defined and mapped. This would include the Project area and surrounding land that may be potentially impacted by the Project. The study area includes the areas that may potentially benefit from additional water made available as a consequence of the Project in the localities of Inkerman, Molongle, Salisbury Plains West and East, Summer Hill, Abbot Point and Bowen.

3.3 Construction

3.3.1 Structure of the channel and pipeline

The following should be provided through text and design plans:

- channel design parameters covering channel grade, lining, width and depth, banks, length, capacity, and operating flows. Construction details should identify the criteria to be used to determine the suitable lining and thickness in relation to the underlying hydrogeology.
- pipeline design parameters covering pipe grade, material, pipe diameter(s), wall thickness, length, capacity, test and operating pressures, depth of cover of the pipe, coating and design life;
- details of the design of associated facilities along the water transport system route, such as pump stations and balancing storages, including their physical dimensions and construction materials;
- relocation of existing infrastructure, if required;
- details of criteria to assess the minimum depth the siphons are to be buried under creeks, rivers and ephemeral water ways, in particular the Elliot River;
- for the proposed water transport system route describe, with the aid of maps and diagrams indicate the location and/or frequency of off-take valves, pump stations, balancing storages, control gates or valves (isolation points), pigging facilities (if applicable) and any other Project facilities and linkages to existing water supply infrastructure;
- location and nature of any proposed temporary or permanent access crossings for machinery, transport etc across any waterway (e.g. construction of causeways, bridges, culvert crossings etc) and any permanent access points or roads for maintenance purposes, in particular where they are adjacent to waterways;
- details of waterway crossing works including the need for removal of riparian vegetation and potential temporary or permanent barriers to fish movement;
- easement widths and access requirements along the route, including the use of existing areas of disturbance for water transport system access and future maintenance;
- criteria for design of structures to allow pipeline or channel crossings of roads including depth of cover; types, grades and diameter of envelopers, design criteria for culverts and backfill and design criteria for replacement road pavement;
- details of the criteria for when siphons or culverts are used for channel crossing;
- details of the criteria of how overland flow will be maintained/managed;
- details of any drainage from the water transport infrastructure entering stream channels as part of the operations;
- details of how stream banks will be excavated, refilled and rehabilitated after the installation of siphons; and
- details of fauna crossings, including number, location and frequency.

3.3.2 Construction activities and infrastructure

The following details that should be provided on the construction of the Project are listed below

- Location and site establishment requirements for construction facilities including location(s) of any temporary construction camps and their associated actual street address access points to and from any State-controlled roads and an indication of workers accommodation arrangements.
- General construction requirements including source and extraction of construction materials:
    - details of the method of construction of the channel and pipelines and volumes of material required;
    - any staging of construction activities;
    - details of all routes used for road haulage of construction materials;
    - construction, realignment and/or upgrading of roads, railways and other infrastructure; and
    - works needed within the channel and pipeline corridor including vegetation clearing, blasting, excavation, and transport infrastructure works and erosion protection.
- Details of all crossings of the channel and/or pipeline of roads and railway corridors, and specific construction methodology and staging requirements for these crossings to meet the requirements of the relevant transport agency (Queensland Transport and Queensland Rail).
- Type, source, quantity and method of transport of construction materials and construction spoil.
- General construction standards and site management including environmental and safety management and the recording of ‘as constructed’ details (particularly channel linings).

- Timetable for construction.
- Licensing/permit requirements for the construction works including sewage treatment, concrete batching and extractive industry and for works within State-controlled road reserves.
- Vehicles, machinery and equipment used for excavation, construction and operation.

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

3.4 Operations

Full details on the proposed on-going management of the water transport system and corridor should be provided including:

- arrangements for operation of the works, e.g. flow, telemetry controls including details of operation and administration, including proposals for remote operation;
- licensing/permit requirements;
- crossings/access;
- construction of additional infrastructure required for operation;
- maintenance activities;
- inspection and surveillance activities and frequency;
- safety procedures (including provision of shut-down and/or venting in event of an emergency);
- provision for public safety in an emergency; and
- management of impacts associated with the translocation of fish species, weeds or other biosecurity risks including pesticides.

This section should describe the proposed system of allocation of water from the Project, with particular reference to the Burdekin WRP and any proposed high priority allocations to specific urban, rural or industrial users. The location and design of any new water distribution infrastructure (e.g. reticulation pipelines) should be described, as well as the expected use of any such existing infrastructure. The capacity of any existing water infrastructure to accept additional loadings resulting from any new or increased allocations of water should also be described.

3.5 Rehabilitation

This section should describe the options, strategies and methods for progressive and final rehabilitation of the environment disturbed by the Project. The strategic approach to progressive and final rehabilitation of the construction site should be described. A preferred rehabilitation strategy should be developed with a view to minimising the amount of land disturbed at any one time. Measures for the mitigation of erosion, particularly along stream banks should be described.

3.6 Decommissioning

The practicality of decommissioning and potential decommissioning options of the channel and pipelines should be addressed at a strategic level to provide an understanding of potential impacts and possible mitigation measures associated with this possible future phase.

3.7 Associated infrastructure requirements

This section should provide descriptions, with concept and layout plans, of potential requirements for constructing, upgrading or relocating impacted infrastructure in the vicinity of the Project area.

The matters to be considered include such infrastructure as roads, bridges, tracks and pathways, any associated water supply infrastructure, power lines and other cables and wireless technology (e.g. microwave telecommunications). Private, local government and community owned infrastructure, including buildings and significant structures should be identified.

The temporary infrastructure requirements of the construction phase should be clearly separated from the permanent relocation of infrastructure.

3.7.1 Transport

This section should provide a brief overview of transport requirements. Full details of transport volumes and routes should be provided in accordance with Section 4.9 Transport and Access Arrangements.

3.7.2 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 Project. The locations of any easements should be shown on the infrastructure plan. Energy conservation should be described in the context of any State and local government policies.

3.7.3 Telecommunications

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

Telecommunications requirements for the Project should also be noted.

3.7.4 Water Supply

The EIS should provide information on water usage by the Project during construction, including the proposed and optional sources of water supply should be described (e.g. bores, any surface storages such as dams, watercourses and municipal water supply pipelines, etc).

3.7.5 Sewerage

This section should describe, in general terms, the sewerage infrastructure required by the Project. Should on-site sewage treatment be proposed for the construction and operation phases, the size and capacity for such a plant should be described sufficiently to obtain Environmentally Relevant Activity (ERA) approvals through the Queensland Environmental Protection Agency (EPA).

3.7.6 Stormwater

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

3.7.7 Other infrastructure

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

- fuel storage areas;
- equipment hardstand and maintenance areas; and
- waste management.

4 Environmental values and management of impacts

This section should address all elements of the environment, (such as land, water, coast, air, waste, noise, nature conservation, cultural heritage, social and community, health and safety, economy, hazards and risk) in a way that is comprehensive and clear.

To achieve this, the following issues should be considered for each environmental value relevant to the project.

- Environmental values affected: describe the existing environmental values of the area to be affected including values and areas that may be affected by any cumulative impacts (refer to any background studies in Appendices - 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 the likely impact of the Project on the identified environmental values of the area. The expected cumulative impacts of the Project must be considered over time or in combination with other impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, any requirements and recommendations of relevant State planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans

should be addressed. Management of impacts relevant to Commonwealth assessment will specifically (but not limited to) potential impacts upon the semi-evergreen vine thicket, dugong, sea turtle, humpback whale and values of the Great Barrier Reef World Heritage Area.

- Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial, aquatic and marine ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the Project and other proposals competing for use of the local air and water sheds.
- Where impacts from the Project will not be felt in isolation to other sources of impact, it is recommended that the proponent develop consultative arrangements with other industries in the study area to undertake cooperative monitoring and/or management of environmental parameters. Such arrangements should be described in the EIS.
- Environmental protection objectives: describe the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). The measurable indicators and standards can be determined from legislation, support policies and government policies as well as the expected performance of control strategies. Objectives for progressive and final rehabilitation and management of contaminated land should be included.
- Recommend control strategies for inclusion in the EMP to achieve the objectives: describe the control principals, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives; include designs, relevant performance specifications of plant. Details are required to show that the expected performance is achievable and realistic.
- Monitoring programs: describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals.
- Auditing programs: describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed.
- Management strategies: describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented e.g. 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.

Environmental protection objectives may be derived from legislative and planning requirements which apply to the Project including Commonwealth strategies, State planning policies, local authority strategic plans, environmental protection policies under the *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 impact.

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 monitoring for the project (see section 5).

4.1 Climate

This section should describe historic weather patterns in the study area and seasonal conditions (e.g., cyclones, thunderstorms, floods and storms) that may influence timing and/or construction methods and how this would be managed. The vulnerability of the area to natural or induced hazards, such as floods, bush fires and earthquakes should also be addressed including the relative frequency, magnitude and risk of these events.

The EIS should include a discussion of the potential impact of predicted climate change (based on available information) that may be relevant to the Project i.e. alteration to availability of water resources, evaporation rates, flooding etc.

This section should indicate how weather predictions and observations would be used to minimise the risk of adverse impacts to the Project area during the construction period.

4.2 Land

This section should detail the existing land environment for the Project area, including areas affected by associated infrastructure relocation or construction.

This section should also describe the potential for the construction and operation of the Project to change existing and potential land uses of the Project area and adjacent areas.

This section will aim to provide the necessary information that is required to assess any potential impacts upon matters of NES, including threatened and migratory species listed under the EPBC Act and on impacts upon values of the Great Barrier Reef World Heritage Area.

4.2.1 Land use and infrastructure

Description of environmental values

The EIS should identify the following, with the aid of maps:

- land tenure and owner/custodian (unless excluded for privacy reasons) within the Project area including reserves, tenure of special interest such as protected areas (including Fish Habitat Areas, Marine Parks) and forest reserves, roads and road reserves, bridges, railways and rail reserves, and stock routes;
- land use (urban, residential, industrial, agricultural, pastoral, forestry, recreational, roads, mining including mining and petroleum exploration tenures, mining leases, mining claims, mineral development licenses and extractive industry permits);
- areas covered by applications for native title determination or native title determinations, including traditional and contemporary uses of land and water by Aboriginal people. A description of Native Title Representative Bodies (NTRB) boundaries should be provided;
- information on any known occurrences of forest and timber resources, economic mineralisation, gas and oil fields and extractive resources within the Project area;
- location of gas and water pipelines, power lines, telecommunication cables, roads, railways, bridges, airports, airstrips, helipads and any other infrastructure;
- the location of all existing dwellings, significant structures and the zoning of all affected lands according to the existing Bowen Shire and Burdekin Shire planning schemes; and
- land classified as GQAL in the DNRWs land classification system is to be shown in accordance with the GQAL planning guide.

Potential impacts and mitigation measures

The potential for the construction and operation of the Project to change existing and potential land uses of the proposal site and adjacent areas should be detailed. The factors favouring or limiting the establishment of those options should be given in the context of land use suitability prior to the Project and minimising potential liabilities for long-term management.

A description of the following should be included:

- the land acquisition strategy for the corridor;
- impacts on individual properties and businesses affected by the Project – area and type of land in the corridor, property facilities affected, access changes to and within the property, impacts on land use, loss of infrastructure, need for relocation and resumption should be discussed;
- discussion of the Project's construction and operational impacts on continued access to all parts of properties traversed by the project corridor, the effect on property management for stock, cropping and weed control, and the likely impacts on existing road and rail networks (both farm and gazetted roads);
- possible impacts on existing rights to overland flow water associated with redirection of flow through culverts or other structures;

- identification of any millable timber or quarry resources within the Project area and an assessment of the commercial value of these resources (based on available information);
- possible impacts on, or sterilisation of, identified mineral or energy resources and extractive industry deposits, the amount of sterilisation (if any) of the deposits resulting from the construction and/or operation of the Project;
- discussion of potential issues involved in proximity and/or collocations of other infrastructure services, and/or the separation requirements of the channel and pipeline, including electric power transmission lines and electrified rail lines, or where construction and maintenance machinery is used in the vicinity of other infrastructure corridors;
- discussion of the potential to mitigate any identified impacts through the selection of an alternative viable route;
- possible effect on town planning objectives and controls, including Council strategic plans;
- description of possible impacts on surrounding land uses and human activities, including impacts to Good Quality Agricultural land and forest reserves as well as residential and industrial uses, and suggested strategies for impact minimisation;
- describe the location of potential benefited areas and discuss the potential impact on land uses from additional water made available as a consequence of the Project. This should include a discussion of likely agricultural activities within benefited areas i.e. crop types, irrigation techniques and operations.

4.2.2 Topography and geomorphology

Description of environmental values

Maps should be provided locating the Project and its environs in both regional and local contexts. The topography of the Project corridor and sites of associated infrastructure, should be detailed with contours at suitable increments (desirably at 1m contours for the corridor) shown with respect to Australian Height Datum (AHD). Significant features of the landscape should be included on the maps. Commentary on the maps should be provided highlighting the significant topographical and geomorphologic features.

In areas, where acid sulphate soils may be disturbed, and for major watercourse crossings, surrounding topography should be detailed at 1m increments with levels shown with respect to AHD.

Potential impacts and mitigation measures

- The Project should be discussed in the context of major topographic features and any measures taken to avoid or minimise impact to such, if required.
- The Project should be discussed in the context of its effect on overland flow in the floodplain (e.g. flow directions and barriers etc).
- The objectives to be used for the Project in re-contouring, consolidation, rehabilitation, fencing, monitoring and landscaping should be described. Consideration should be given to the use of threatened plant species during any landscaping and re-vegetation.

4.2.3 Geology and soils

Description of environmental values

The EIS should provide a description and maps of the geology of the study area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance, which may influence occupational health, the quality of water being stored at the site or impacts on infrastructure. Geological properties that may influence: ground stability; rehabilitation programs; or the quality of wastewater leaving any area disturbed by the proposal should be described.

Soils within the study area should be described and mapped at a suitable scale, with particular reference to the physical and chemical properties of the soils which would influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land. Information should also be provided on soil stability and suitability for construction of all Project facilities.

Soil should be mapped at a suitable scale and described according to the Australian Soil and Land Survey Field Handbook (Gunn et al 1988 and McDonald et al, 1990) using the Australian Soil Classification (Isbell, 1996). An appraisal of the depth and quality of useable soil should be undertaken. Information should be presented according to the standards required in the Planning Guidelines: The Identification of Good Quality Agricultural

Land (DPI, DHLGP, 1993), which supports State Planning Policy 1/92: Development and the Conservation of Agricultural Land. The area of GQAL that will be affected should be clearly indicated, and an assessment of the potential for land use conflict with GQAL is required with investigations following the procedures set out in the planning guidelines referred to above.

Soil descriptions must include horizon differentiation and depths, field texture, colour, mottles, drainage, permeability and water holding capacity characteristics, soil structure, erosion hazard rating, pH and electrical conductivity. The location of each borehole will be accurately presented, and boreholes will equitably represent the different soil types present. Any highly erodible soils, saline sites and sites which are particularly susceptible to becoming saline should be especially identified.

Information should also be provided on soil stability and suitability to construction of all facilities and infrastructure.

Potential impacts and mitigation measures

This section should provide details of any potential impacts to the land resources and proposed mitigation measures, including:

- the availability, location and suitability of rock, clay, sand and gravel for use as construction materials;
- assessment of likely erosion effects of all Projects aspects, both on and off the project site and measures to ensure that soil erosion does not accelerate within the Project area;
- influence of time of year of construction on the impact on soils;
- management measures for acid sulphate soils that may be encountered in association with the Project should be described in the EMP. All proposed measures should be consistent with the guidelines that support State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils Version 2 (DLGP and DNRW, August 2002) and Soil Management Guidelines Version 3.8, DNRW November 2002 (Dear et al, 2002);
- details of erosion control measures and criteria used to assess methods that would minimise or alleviate erosion and sedimentation over the various permanent and temporary landforms. For each major soil type identified, erosion potential and erosion management techniques should be outlined. Erosion monitoring should be discussed along with the development of rehabilitation/mitigation measures to achieve acceptable soil loss rates; and
- 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. Erosion and sediment control should be described with a Soil Erosion and Sediment Control Plan included in the EMP.

4.2.4 Land contamination

Description of environmental values

Areas of potential contamination within the channel corridor, including cattle dips, chemical storages, historic mine sites etc, should be evaluated. Should potentially contaminated sites be identified, a preliminary site investigation (PSI) of the site consistent with the EPA's Draft guidelines for the assessment and management of contaminated land in Queensland (EPA, 1998) (EPA Draft Guidelines) should be undertaken to evaluate the existence of past and present potentially contaminating activities. The results of the PSI should be summarised in the EIS and provided in detail in an appendix.

If the results of the PSI indicate potential or actual contamination, a schedule of further investigation progressively managed in accordance with the stages outlined in Appendix 5 of the EPA Draft Guidelines (EPA, 1998) will be prepared. This schedule would be undertaken if the Project was approved and advanced to the construction phase.

In short, the following information should be provided as part of the EIS:

- mapping of any areas listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR) under the EP Act;
- identification of any potentially contaminated sites not on the registers which may need remediation; and
- a schedule of further investigations and remediation activities recommended for those land parcels where soil contamination may have an impact on construction activities and/or operation of the channel.

Potential impacts and mitigation measures

This section should discuss any potential impacts from contaminated land and proposed mitigation measures, including:

- discussion of any risks to occupational or human health, as a result of any residual contamination levels, to any of the proposed uses of the channel, including agricultural or human consumption, including potential impacts on water quality; and
- the means of avoiding contaminated land areas should be addressed. Methods proposed for preventing, recording, containing and, if necessary, 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 after completion of construction of the Project.

4.2.5 Visual amenity

Description of environmental values

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:

- major views, view sheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences in the affected area along the route;
- focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site;
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;
- identification of the areas of the proposal that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and
- the value of existing vegetation as a visual screen.

Potential impacts and mitigation measures

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

4.3 Nature conservation

4.3.1 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 the marine environment, waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and habitat corridors should be described. The description should include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local and regional and state perspective. The description should indicate any areas of state or regional significance identified in an approved biodiversity planning assessment (BPA) produced by the EPA (e.g. see the draft Regional Nature Conservation Strategy for SE Qld 2001-2006).

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

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

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

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

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

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

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

The EPA's guidelines for "Fauna and Flora Assessment in EIA" provide further details. The EPA should be consulted on the scope of any biological studies before they are undertaken.

4.3.1.1 Terrestrial flora

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

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

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

Regional ecosystem mapping within the study area should be reviewed against data collated or collected during the EIS process. In particular grassland areas on the heavier soils should be reviewed using historical records and oldest available air photos to determine whether they are remnant (i.e. natural grasslands) or non-remnant (i.e. cleared or disturbed).

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

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

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

- site data should be recorded in a form compatible with the Queensland Herbarium CORVEG database.
- the minimum site size should be 10 by 50 metres;
- a complete list of species present at each site should be recorded;
- the relative abundance of plant species present should be recorded;
- any plant species of conservation, cultural, commercial or recreational significance should be identified; and
- 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 surveys consistent with the above methodology. Methodology used for flora surveys should be specified in the appendices to the report.

4.3.1.2 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) and abundance of animals, including amphibians, birds, reptiles, mammals and bats. Species diversity and species distribution should be extrapolated where possible by the regional ecosystem and land condition mapping;
- 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 (as defined in section 3.2) based on knowledge of species present in the Brigalow Belt subregions 1 (Townsville Plains) and 2 (Bogie River Hills), including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, threats 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 nomadic terrestrial fauna.

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

Advice on a recommended fauna survey methodology may be obtained from EPA.

4.3.1.3 Aquatic biology

The patterns and distribution of waterways including associated palustrine and/or lacustrine wetlands as well as coastal and marine environments within the area potentially affected by the proposed project including the benefited and downstream areas should be mapped and described. The description of the aquatic flora and fauna should include a review of current and previous studies of the aquatic biology in the study area and other relevant areas within the region. If little or no information exists describing the aquatic biology, for all or some of the aquatic environments, then data must be collected using both qualitative and quantitative methods to describe the aquatic flora and fauna within the areas potentially affected by the proposed project. The description should consider temporal variability in the distribution of the aquatic biota related to the seasonality of the aquatic environments in the project area.

The description of the fauna and flora present or likely to be present in the area should include, but not be restricted to:

- aquatic habitats and environments, including riparian habitats and groundwater dependant ecosystems;
- aquatic substratum including, benthic, edge and substratum associated with aquatic and riparian flora;
- aquatic plants including, benthic, floating and emergent macrophytes; and
- aquatic fauna including, fish, crustaceans and other aquatic invertebrates, and aquatic dependent mammals, reptiles, amphibians.

The suite of aquatic habitats and environments in the study area should be identified and survey sites chosen to be representative of key habitats. These areas may include significant wetlands, areas where the proposed project is likely to have significant effect on connectivity, or where downstream effects are likely.

The EIS should include a list of all known and potential rare, endangered, threatened or otherwise noteworthy species or assemblages present, or likely to be present and dependent on the aquatic environments of the project area. A detailed profile of each species or assemblage should be included with a discussion of the species range, habitat, breeding, recruitment, feeding and movement requirements. The profile should include a risk assessment of threats to the populations of each rare, endangered, threatened or otherwise noteworthy species or assemblage and an evaluation of the potential impacts of the whole of the proposed project. The occurrence of aquatic biota of conservation significance should be geocoded to mapped vegetation units or habitats, which can then be used to identify areas with important fauna values in adjoining areas affected by the project.

4.3.2 Potential impacts and mitigation measures

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

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

The discussion should cover all likely direct and indirect environmental harm due to the project on flora and fauna. Terrestrial and aquatic (marine and freshwater) environments should also be covered. Also include human impacts and the control of any domestic animals introduced to the area.

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) should be discussed. Emphasis should be given to potential environmental harm to benthic and intertidal communities, seagrass beds and mangroves.

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

The potential environmental harm to the ecological values of the project 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.

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.

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

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

4.3.2.1 Terrestrial fauna

The EIS should include a qualitative risk assessment for all known and potential rare, threatened or otherwise noteworthy species or communities in the study area. In particular, this risk assessment should consider the potential for:

- potential impacts of increased traffic;
- increased feral animal impacts;
- increased weed invasion;
- direct loss of habitat and/or dissection of habitat;
- impacts on riparian and seasonal wetlands; and/or
- adverse effects upon vertebrate species dispersal, including the potential differential effect upon taxonomic groups with differing dispersal ability. Outline how any decreases in dispersal potential can be mitigated.

A similar risk assessment should be completed for migratory birds, nomadic birds and nomadic terrestrial fauna identified in the study area.

The EIS must include a discussion of how habitat loss and fragmentation would be avoided, reduced and/or offset. The provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory, nomadic and aquatic animals should be discussed.

4.3.2.2 Aquatic biology

The assessment of the potential impacts (both temporary and long term) on the aquatic biology should consider, where appropriate:

- direct or indirect effects related to water quality degradation and/or toxic contamination of surface and groundwater;
- changes in light and temperature regimes associated with the loss or degradation of riparian habitat;
- direct loss, degradation or displacement of habitat;
- alterations to flow and temporal dynamics of surface or groundwater availability;
- any proposed stream diversions, causeway construction and crossing facilities, stockpiled material and other impediments that will restrict free movement of fish and other biota, including temporarily during construction;
- changes in connectivity between habitats that enable recruitment and movements associated with life cycle requirements;
- barriers to movement of aquatic biota, including physical barriers, barriers created by localised poor water quality conditions and barriers created by surface water flow changes. Note that under the *Fisheries Act 1994*, DPIF is required to assess the need for approvals for temporary and permanent constraints to fish movement;
- water quality changes associated with changes to flow regimes and/or excessive aquatic plant growth, e.g. dissolved oxygen cycling;
- changes in assemblage structure associated with trophic dynamics, brought about by nutrient enrichment and/or changes to organic basal inputs (e.g. heterotrophic to autotrophic);
- changes in assemblage structure associated with exotic fish species and non-indigenous and noxious plants and associated changes to aquatic habitats and environment; and
- the potential for inter-basin transfers of aquatic flora and fauna species including a discussion of the proposed techniques to avoid or limit the transfer of exotic fish and weed species.

Qualitative descriptions and assessment of potential impacts on the aquatic flora and fauna in the study area should be included along with a discussion of proposed management measures within each of the benefited areas.

Impacts on rare and threatened or otherwise noteworthy animal species, including listed threatened and listed migratory species and their habitats, as well as species important for recreation and commercial fisheries should be assessed.

Consideration of the cumulative impacts from development arising from the provision of water through the Project on aquatic flora and fauna, habitat and fisheries should be presented.

4.4 Water resources and water quality

4.4.1 Water resources - hydrology

Description of environmental values

This section should describe the existing environment for water resources that may be affected by the Project and in the context of environmental values as defined in such documents as the EP Act, Environmental Protection (Water) Policy 1997 and ANZECC 2000. If 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 this application.

This section should describe:

- existing surface drainage patterns, flows, history of flooding including extent, levels and frequency and present water uses;
- environmental values of the surface waterways of the areas likely to be affected in terms of:
    - values identified in the Environmental Protection (Water) Policy;

- physical integrity, fluvial processes and morphology of watercourses and wetlands, including riparian zone vegetation and form;
- hydrology of floodplains, waterways and groundwater;
- any Water Resource Plans, Groundwater Management Plans relevant to the affected catchment;

- the watercourses and wetlands to be crossed by the channel/pipeline showing planned crossing locations on a map. Discuss consideration of alternative crossing locations in environmentally sensitive areas. It should also be identified if any sections of the channel/pipeline route run parallel to any waterway or water body; and
- potential sources of water for construction.

Potential impacts and mitigation measures

This section should discuss the direct impacts of the channel construction and operation and the indirect impacts of additional water on hydrology. The indirect impacts should be based on the benefited area land use impacts identified in Section 3.2.1.

Matters to be addressed should include:

- proposed drainage structures for all aspects of the Project, including supporting facilities such as access roads;
- effects of drainage works, placement of fill, clearing or any other alterations to existing topography and landform on the hydrology of the site including any alteration to drainage patterns and the water table and secondary influence on flooding, erosion and siltation;
- timing of the construction works relative to likely periods of flooding and proposals to minimise the risk of adversely impacting water quality;
- measures to ensure weeds, including seeds, are not released into the water environment including from machinery traversing creek systems or riparian areas;
- proposals to divert waterways during construction or operations, and, if applicable, for the reinstatement of the waterways. The effects on neighbouring landholders should be considered, and any works requiring permits or licensing in accordance with the *Water Act 2000* identified;
- impacts of channel crossings on existing flows;
- the final drainage and seepage control systems and any long-term monitoring plans should be described, inclusive of impacts to groundwater; and
- implications of interbasin transfers from the Burdekin River to Bowen.

4.4.2 Water resources - Hydrogeology

Description of environmental values

This section should describe the existing environment for hydrogeology resources that may be affected by the Project in the context of environmental values as defined in such documents as the EP Act, Environmental Protection (Water) Policy 1997 and ANZECC 2000.

The possible significance of the Project to groundwater depletion or recharge, or impact on any existing or potential saltwater intrusion problem of existing aquifers, should be addressed. The depth to groundwater, quantity and water quality and users of the groundwater in the vicinity of the Project should be detailed. The review should include a survey of existing State government registered groundwater supply facilities (bores, wells, or excavations) within the groundwater area impacted by the Project.

This section should include reference to:

- nature of the aquifers;
- geology/stratigraphy, e.g. alluvium, volcanic, metamorphic etc;
- aquifer type, e.g. confined, unconfined etc;
- depth to and thickness of the aquifer;
- hydrology of the aquifers:

- depth to water level and seasonal changes in levels;
- groundwater flow directions (defined from water level contours);
- interaction with surface water;
- possible sources of recharge;
- vulnerability to pollution;
- basic water quality of the aquifer;
- proximity of the groundwater facilities to the Project and value of these facilities for rural, industrial and/or domestic use; and
- the current use of groundwater for irrigated agriculture.

Potential impacts and mitigation measures

This section should discuss the direct impacts of the channel construction and operation and indirect impacts of additional water on groundwater. The indirect impacts should be based on the benefited area land use impacts identified in Section 4.2.1.

In particular, this section should assess:

- the overall impacts of the Project on the availability and quality of local groundwater resources including the potential for waterlogging, salinisation and increased potential for Acid Sulfate Soils from rising water tables. This discussion should also include the potential for leakage from the channel and techniques proposed to minimise or avoid adverse impacts during construction and operational phases;
- the impacts of project related vegetation clearing, sedimentation and salinity to local groundwater resources;
- the extent of the area within which groundwater resources are likely to be affected by the proposed operations, and proposed management options to monitor and mitigate these effects;
- where groundwater is determined to be at risk, options for the prevention or mitigation of such risk should be fully described;
- where relevant, the implications any changed groundwater regime may have on operational issues such as allocations and tradeable water rights;
- information on the characteristics of target aquifers, including seasonal variability, capacity to provide the required volumes of water at the expected usage rate, recharge potential and profile of existing extraction;
- assessment of the impacts of the required extraction of groundwater resources and proposed mitigation measures to reduce the impact of the Project on groundwater quality including the potential for interconnection between the target and underlying aquifers;
- identification of groundwater resources proposed to be used by the Project, if any, including a description of the quality, quantity, usage rate and required location of those resources;
- decommissioning of temporary groundwater bores;
- the need or otherwise for licensing of any groundwater bores under the *Water Act 2000* should be discussed.

In relation to studies conducted to support planning for the Project, methods used and all information obtained should be reported.

4.4.3 Water quality

Description of environmental values

This section should describe the existing environment for water quality that may be affected by the Project in the context of environmental values as defined in such documents as the EP Act, Environmental Protection (Water) Policy 1997 and ANZECC 2000.

This section should describe:

- existing surface and ground water quality in terms of physical, chemical and biological characteristics at the Project area. The water quality objectives for the Elliott and Don Rivers should be summarised, with reference to the EPP Water, the latest ANZECC Guidelines and Water Quality Objectives (WQOs) being

developed through the Coastal Catchment Initiatives of the Reef Water Quality Protection Plan, where appropriate;

- estimated contaminant loads exported by irrigated agriculture and other land uses that may benefit from the water supplied through this project. (This would preferably be done on a per unit area for irrigated land use so that the effects of expansion could be extrapolated or modelled in 4.5.2);
- the water quality (historical, current) of waterways in the project area, in particular the Elliott and Don Rivers, in comparison with water quality in adjacent catchments should be made;
- any seasonal variation in water quality parameters (including temperature, dissolved oxygen, chlorophyll, turbidity, total suspended solids, pH, electrical conductivity, metals and nutrient levels, as well as phytoplankton including blue-green algae);
- assessment of the potential for lower quality water from run off or seepage to be captured by the channel structure leading to a reduction in the quality of water delivered by the project to the end users;

The basis for this assessment should contain a literature review supplemented by a monitoring program. Complementary stream-flow data should also be obtained from historical records (if available) to aid in interpretation.

Potential impacts and mitigation measures

This section should assess potential impacts on water quality environmental values identified above. It should also define and describe the objectives and practical measures for protecting water quality environmental values both in construction and operational phases (separately), to describe how nominated standards and indicators may be achieved, and how the achievement of the objectives would be monitored, audited and managed. The requirements of the EPP Water and other relevant Government legislation and policies should be discussed.

This section should discuss the direct impacts of the channel construction and operation and indirect impacts of additional water on water quality. The indirect impacts should be based on the potential benefited area land use impacts identified in Section 4.2.1.

Matters to be addressed should include:

- surface and groundwater quality, quantity, drainage patterns and sediment movements;
- the beneficial use of both surface water and groundwater;
- monitoring programs to assess the effectiveness of management strategies for protecting water quality during the construction, operation and, if applicable, decommissioning of any temporary structures;
- quality of the water leaving the Project construction site and associated infrastructure construction sites during construction and operation;
- quality of water transported through the channel under projected operating conditions and seasonal variation (including pollutant concentrations and relevant parameters such as pH, dissolved oxygen, turbidity, metals and suspended solids) and implications for drinking water standards;
- potential impact of water quality changes on flora and fauna in the project area;
- the likelihood of infestation by water weeds which may have the potential to affect the water quality; and
- possible sources of water pollution or other changes in water quality including soil erosion, sedimentation, soil leachates, interaction with groundwater, drilling fluids, accidental spills, waste and sewage disposal and likely chemical composition of any leachate from introduced fill on the site.

4.5 Coastal environment

4.5.1 Description of environmental values

This section describes the existing coastal environment, which may be affected by the proposal in the context of coastal values identified in State of the Environment - Coastal Zone reports, State Coastal Management Plan (Table 1) and environmental values as defined by the *Environmental Protection Act 1994* and environmental protection policies. The Environmental Protection (Water) Policy has a set of default environmental values for waterways that include aquatic ecosystem protection.

This section should also identify actions associated with the project that are assessable development within the coastal zone and will require assessment under the provisions of the *Coastal Protection and Management Act 1995*.

Provide baseline information on water quality of coastal waters, coastal ecosystems and in estuaries below the limit of tidal influence, including heavy metals, nutrients, acidity, and turbidity and oil in water. Discuss the interaction of freshwater flows with marine waters its significance in relation to marine flora and fauna adjacent to the proposal area.

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

- values identified in the Environmental Protection (Water) Policy; and
- the State Coastal Management Plan, in particular policies 2.8.1, 2.8.2 and 2.8.3.

4.5.2 Potential impacts and mitigation measures

This section defines and describes the water quality objectives and practical measures for protecting or enhancing coastal environmental values, to describe how nominated standards and indicators may be achieved, and how the achievement of the water quality objectives will be monitored, audited and managed.

Describe the water quality objectives used (including how they were developed), and how predicted activities will meet these objectives (refer to the EPA's *Queensland water quality guidelines* and the *Australian and New Zealand guidelines for fresh and marine water quality*, ANZECC, 2000.

Current contaminant loads exported from existing land use activities in the study area should be described to enable estimation of contaminant load exports under scenarios of intensified or expanded land use activities due to the availability of the supplied water. This analysis should address all risks to the marine environment from erosion, fertiliser and pesticide run-off.

The potential environmental harm caused by the proposal on coastal resources and processes should be described in the context of controlling such effects. The State Planning Policy – Planning and Managing Development involving Acid Sulfate Soils 2002 should be addressed as should the State Coastal Management Plan 2001 and QDPI Guidelines for Marine Areas.

The role of buffer zones in sustaining fisheries resources through maintaining connectivity between coastal and riparian vegetation and estuarine and freshwater reaches of catchments should be discussed.

4.6 Air environment

4.6.1 Description of environmental values

This section should describe the existing air environment, which may be affected by the proposal in the context of environmental values as defined by the EP Act and Environmental Protection (Air) Policy 1997.

Ambient air quality conditions in terms of particulate matter should be described for any sensitive sites (residences) in proximity to the water transport system, associated infrastructure development areas and potential benefited areas, including any baseline monitoring results.

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 the proposed project's activities, including fossil fuel based electricity consumed; and
- briefly describe method(s) by which estimates were made.

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

4.6.2 Potential impacts and mitigation measures

The following air quality issues should be considered:

- describe the quality and quantity of air emissions within the Project area expected during construction and operational activities;

- impacts of dust generation from construction activities (including extractive industries associated with provision of construction material), especially in areas where construction activities are adjacent existing road networks or pass in close proximity to residences;
- identification of climatic patterns that could affect dust generation and movement;
- predicted changes to existing air quality from vehicle emissions and dust generation along haulage routes;
- amelioration or mitigation measures for each identified impact relating to vehicle emission, dust generation and gaseous emissions should be proposed;
- an assessment of the type and volume of greenhouse gases emitted by the Project during construction and operation and the measures taken to reduce emissions in line with national and state abatement policies and guidelines; and
- "any mitigation measures for the management of dust resulting from haulage on roads should be included in a road-use management plan (RMP) detailed in section 4.9."

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 and maximising the use of renewable energy sources;
- an assessment of how the preferred measures minimise emissions and achieve energy efficiency; 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 are minimised; and/or
- maximising the use of renewable energy sources.

The draft 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;
- 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.

4.7 Waste

4.7.1 Waste generation

The EIS should identify and describe all sources of waste associated with construction, operation and decommissioning of all aspects of the Project, using schematic diagrams for each distinct phase. This section should describe all activities including:

- chemical and mechanical processes conducted on the construction sites/camps (e.g. chemical storage, sewage treatment, power generation, fuel burning, mechanical workshop, diesel storage);
- the amount and characteristics of solid and liquid waste (including groundwater from excavations, vegetation surplus, run-off from roads, plant areas, chemical storage areas and workshops) produced on-site by the Project;
- any waste treatment process involved, including site drainage and erosion controls;

- selection criteria, and show on the map likely run off/stormwater discharge points;
- hazardous materials to be stored and/or used on-site, including their Material Safety Data Sheets and environmental toxicity data and biodegradability for raw materials and final products;
- descriptions should also include (using maps and plans as appropriate):
    - generation points;
    - storage methods and facilities;
    - quantities;
    - disposal arrangements; and
    - recycling/reuse arrangements.

The EIS should provide details of any waste water output including:

- volume estimates of industrial and domestic effluent that would be produced at each Project site;
- quality of effluent produced;
- any mobile sewerage facilities to be used; and
- the proposed method of disposal and extent of use of local government facilities (i.e. Council sewerage works).

4.7.2 Waste management

Having regard for best practice waste management strategies, the Environmental Protection (Waste Management) Policy 2000 (EPP Waste) and the Environmental Protection (Waste Management) Regulation 2000 (EPR Waste), the proposals for waste avoidance, reuse, recycling, treatment and disposal should be described.

This section should describe waste management strategies, including reduction, reuse, recycling, storage, transport and disposal of waste, including measures to minimise attraction of vermin, insects and pests.

This section should assess the potential impact of all wastes to be generated during construction and operation and provide details of each waste in terms of:

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

The EIS should address waste minimisation techniques and processes proposed and the market demand for recyclable waste (where appropriate).

4.8 Noise and vibration

4.8.1 Description of environmental values

This section should describe the existing noise and vibration environment, which may be affected by the proposal in the context of environmental values as defined by the EP Act and EPP Noise.

Sensitive noise receptors within and adjacent to the Project area should be mapped and typical background noise levels discussed. The potential sensitivity of such receptors should be discussed and performance indicators and standards should be nominated for each affected receptor. Current background levels for noise should be surveyed or reported.

4.8.2 Potential impacts and mitigation measures

The following analysis of noise impacts should be assembled:

- the levels of noise generated during construction of all aspects of the Project and ancillary activities (e.g. access roads, camp sites) and operations should be assessed against current typical background levels;
- the potential environmental impact of noise and vibration at all potentially sensitive places, in particular, any places of work, residence, recreation, or worship, should be quantified and compared with objectives, standards to be achieved and measurable indicators;
- this should also include environmental impact on terrestrial and aquatic animals and avifauna;
- proposals to minimise or eliminate these effects should be provided, including details of any screening, lining, enclosing or bunding of facilities, or timing schedules for construction and operations that would minimise environmental harm and environmental nuisance from noise; and
- assessment should be made of the potential impacts (including compliance with relevant legislation) of blasting required for construction of the channel or other infrastructure construction, including potential buffers to minimise or eliminate these effects.

4.9 Transport and access arrangements

4.9.1 Transport methods and routes

The EIS should describe the current existing road network and intersections of the surrounding region specifying current traffic volumes, notably on the Bruce highway, and associated access points.

The EIS should discuss transport methods and routes for delivering construction and operational equipment and materials, other necessary goods and consumables and workforce transportation. Information should include:

- volumes, tonnage, and composition of construction inputs;
- hazardous or dangerous material that may be transported;
- modes of transport (e.g. sea, rail, road) and the type of vehicles most likely to be used for transport;
- number and type of workforce traffic and service vehicles;
- number of trips generated (both light and heavy vehicles);
- origin and destination of inputs and transport routes proposed (with the use of maps);
- existing traffic volumes on the proposed transport routes;
- details of over-dimension, excess mass loads or any hazardous goods; and
- timing and duration of transport.

The EIS should clearly and fully describe transport information for all stages of the Project including:

- all requirements for the construction, upgrading or re-location of any transport-related infrastructure, including rail or rail level crossing infrastructure (pursuant to s255 of the Transport Infrastructure Act 1994) and/or any need for increased road maintenance;
- any new access requirements to State-controlled or local government roads and rail networks; and
- sufficient details to allow the Department of Main Roads (DMR), Queensland Transport, Queensland Rail and Local Councils to ascertain compliance with legislative and design requirements.

4.9.2 Potential transport impacts and mitigation measures

Assessment of impacts for the entire area impacted by the Project during both construction and operational phases should discuss the following:

- the likely impacts and mitigation strategies of new roads or road realignments that are required as a result of the Project, including impacts on all stakeholders along the routes and how these should be managed.
- the likely impacts and mitigation strategies of increased traffic on local and regional road networks (with appropriate directional distributions), with reference to:
    - traffic volume;

- daily movement patterns;
- vehicle size and types, including heavy vehicle access;
- usage rates;
- public transport and school bus routes within the nominated area;
- road safety issues, including safe access to construction sites and the potential impacts of dust (e.g. consideration of the need for turning lanes, improved sight lines, waiting areas, off-road parking locations);
- reduced efficiency of traffic flows or intersections along key routes, especially during construction;
- additional wear/reduced life of pavements requiring additional or accelerated rehabilitation and maintenance (if any);
- social, amenity, environmental or cultural heritage impacts of transport not covered in other sections;
- the proposed traffic management arrangements and plans, especially within rural residential areas and steps to be taken to prevent public access to construction access ways not provided on public roads; and
- emergency access.

- the likely impact of increased traffic on rail haulage systems (if any);.
- the likely impact and mitigation strategies required to any disruptions to rail haulage systems;.
- environmental issues relating to transport (e.g. weed management, vegetation clearing in road reserves, dust control and erosion protection) are adequately assessed and ways to ameliorate any adverse impacts are outlined; and
- the impacts of construction with regard to seasonal considerations such as potential for road impacts during wet weather.

Findings of studies and assessments of any required road impact or traffic management mitigation strategies should be incorporated into a road-use management plan (RMP) within the Environmental Management Plan for the project. If any mitigation strategies are necessary, these will need to be completed to Main Roads standards.

Road impacts should be described and assessed in accordance with Main Roads' *Guidelines for Assessment of Road Impacts from Development (2006).* The technical findings and assessments should be summarised in a Road Impact Assessment (RIA) report, under section 8.5 (Technical Data and Baseline Studies). Reference should be made to other Main Roads documents, including Main Roads Road Planning and Design Manual."

4.10 Cultural heritage

4.10.1 Description of environmental values

The EIS should describe the existing environment values for cultural heritage that may be affected by the Project activities.

A cultural heritage survey (as part of the CHMP process or otherwise) should be undertaken to describe Indigenous and non-Indigenous cultural heritage sites and places, and their values, and include:

- Consultation with:
  - the Register of the National Estate;
  - the EPA regarding the Queensland Heritage Register and other information regarding places of potential non-indigenous cultural heritage significance;
  - the Department of Natural Resources, Mines and Water regarding the Indigenous Site Database.
  - any local Government heritage register; and
  - any existing literature relating to the affected areas.
- Liaison with representatives of relevant indigenous community/communities concerning:
  - places of significance (including archaeological sites, natural sites, story sites etc), and appropriate involvement in field surveys;

    - any requirements by communities and/or informants relating to selection of consultants and confidentiality of site data. Non-indigenous communities may also have relevant information; and
    - significance assessment of any cultural heritage sites/places located.
- Liaison with relevant community groups/organisations (e.g. local historical societies) concerning:
    - places of non-Indigenous cultural heritage significance; and
    - opinion regarding significance of any cultural heritage places located or identified.
- Reference to locations of culturally significant sites likely to be impacted by the Project construction (having due regard for any confidentiality requirements specified by community representatives), including:
    - stone artefact scatters;
    - culturally significant vegetation;
    - buildings or places of cultural, historical or archaeological significance;
    - archaeological sites, natural sites, story sites etc.;
    - a constraints analysis of the proposed development area to identify and record indigenous and non-indigenous cultural heritage places;
    - when examining tenure, the location of mining areas with historical significance should be shown on maps; and
    - a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and conclusions and management recommendations (having due regard for any confidentiality requirements specified by community representatives).

As a minimum, investigations and consultation should be undertaken in such manner and detail to satisfy statutory responsibilities and duties of care, including those under the *Queensland Heritage Act 1992*, the *Aboriginal Cultural Heritage Act 2003* and the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, to protect areas and objects of cultural heritage significance.

A plain language contractor guide should be developed in conjunction with the development of a CHMP.

4.10.2 Potential impacts and mitigation measures

The Proponent should provide an assessment of any likely effects on sites of non-Indigenous or Indigenous cultural heritage values, including but not limited to the following:

- description of the significance of artefacts, items or places of conservation or cultural heritage value likely to be affected by the proposal and their values at a local, regional and national level;
- recommended means of mitigating any negative impacts on cultural heritage values and enhancing any positive impacts;
- negotiations with Queensland Heritage Council (QHC) and the EPA regarding management of places of historic heritage significance, taking account also of community interests and concerns;
- documented management strategies in accordance with the outcomes of negotiations with QHC, EPA and community; and
- Commonwealth heritage legislation and registers.

The management of Aboriginal cultural heritage impacts should be detailed in either an agreement with Aboriginal parties or in a Cultural Heritage Management Plan (CHMP), with the agreement or plan to be developed in a form that complies with the provisions of Part 7 of the *Aboriginal Cultural Heritage Act 2003*, thereby meeting the cultural heritage duty of care.

The agreement or plan must provide a process for the conduct of comprehensive cultural heritage investigations and the identification of Aboriginal cultural heritage objects, areas and values in the proposed Project area. It is also to provide a process for the management of those objects, areas and values identified in the proposed Project area.

The agreement or plan should include the following:

- a process for including Aboriginal communities or Aboriginal Parties in the identification, management and protection of Aboriginal cultural heritage in the Project area;
- a process for undertaking a comprehensive and systematic cultural heritage assessment of the Project area;
- processes for the mitigation, management and protection of identified cultural heritage objects and areas in the Project area, and in any areas to be affected by development of any associated infrastructure, both during construction and operational phases of the Project;
- provision for the management of the accidental discovery of cultural material, including burials, in the Project area;
- processes for determining any requirements for monitoring of the Project during construction, and measures by which any monitoring program is to be implemented;
- cultural heritage induction and awareness programs for Project staff, subcontractors and staff, consultants and agents of the Project; and
- a conflict resolution process.

The development of the agreement or plan is to be negotiated with all relevant stakeholder representatives, subject to any confidentiality specified by the Aboriginal community, registered native title applicants, and/or Aboriginal Parties as appropriate.

As a minimum, impact assessment, management and protection strategies should satisfy statutory responsibilities and duties of care, including those under the *Queensland Heritage Act 1992*, the A*boriginal Cultural Heritage Act 2003* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*.

4.11 Social and economic environment

4.11.1 Description of environmental values

This section should describe the existing social and economic environment. Issues to be addressed include:

- structure of potentially affected communities in the study area;
- community profile, providing information on the following characteristics:
    - rural properties, farms, croplands and grazing areas;
    - demographics and family structure;
    - recreational, cultural, leisure and sporting facilities and activities in relation to the affected area;
    - health and educational facilities;
    - local government and public facilities;
    - current property values;
    - number of properties directly affected by the Project;
    - number of families directly affected by the Project, this should include not only property owners but also families of workers either living on the property or workers where the property is their primary employment;
    - Aboriginal people's traditional and contemporary uses of the land affected by the Project; and
    - existing housing market, particularly rental accommodation, which may be required for, and available to the Project workforce.

The character and basis of the local and regional economies should be addressed including:

- description of the local economy, within regional, state and national context;
- economic contribution of existing enterprises (e.g. farms, tourist activity, local business, etc) and existing future economic opportunities;
- current local and regional economic trends, in particular drought, 'rural downturn', employment and unemployment etc; and

- workforce characteristics, including types of skill or occupations and availability during both construction and operational stages.

4.11.2 Potential impacts and mitigation measures

The social impact assessment of the Project should consider the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the Project's impact, both beneficial and adverse, on the local community.

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

The EIS should address the following matters:

- the effects of the Project on affected landholders and communities, including land acquisition and relocation issues and property valuation and marketability;
- impacts on current land uses (e.g. existing agricultural and grazing) and management practices – e.g. increased regulation of chemical/fertiliser use, disruption movement of livestock and any loss of agricultural land;
- impact of the Project on public health and safety of adjacent communities, including such impacts as noise, dust, waste, transport, and other hazards;
- the potential mechanisms for local communities and businesses to meet contracts for services and supplies for the construction, rehabilitation and operation phases of the Project;
- strategies for local residents including members of Indigenous communities interested in employment opportunities, which would identify skills required for the Project and where practicable initiate appropriate recruitment and training programs; and
- strategies responding to Government Policy relating to:
    - the level of training provided for construction contracts on Queensland Government building and construction contracts - The State Government Building and Construction Contracts Structured Training Policy (the 10% Policy);
    - indigenous employment opportunities -Indigenous Employment Policy for Queensland Government Building and Civil Construction Projects (the 20% Policy);
    - the use of locally sourced goods and services – Department of State Development and Trade Local Industry Policy.

With respect to the project workforce, the EIS should, if relevant, provide:

- an estimate of the number of additional employees that may be housed on-site or in existing local accommodation;
- an estimate of the number of new workers who may be accompanied by dependents;
- a description of the existing local accommodation;
- the size of the private rental market in the catchment area, including caravan parks, backpacker hostels, hotel and motel accommodation and houses;
- the current vacancy rate of rental accommodation, including an assessment of seasonal fluctuations;
- the availability and median cost of housing for purchase in the catchment area;
- any identified constraints and opportunities for new housing construction in the catchment area, including the capacity of the local land development and housing construction industries to provide new housing;
- impacts on labour markets, with regard to the source of the workforce; and
- impacts of the Project workforce on local human services (e.g. education and health facilities), and local community and social recreational environments.

The economic analysis component of the EIS should consider:

- the direct and indirect impact of the Project on the regional, state and national economies in terms of effects on employment, income, supply of goods and services and production. This should include a discussion of the direct economic benefits of enhanced or expanded agricultural activities within the benefited areas;
- the cost to all levels of government of any additional infrastructure provision;
- implications for future development in the locality (including constraints on surrounding land uses and existing industry);
- the economic impacts of the proposal on individuals, businesses, industries or communities, including proposed measures to mitigate any negative impact; and
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future.

4.12 Hazard and risk

4.12.1 Hazard analysis

This section of the EIS should describe the potential hazards and risks that may be associated with the Project. Consultation with the relevant representative of the Department of Emergency Services is advised. A preliminary hazard analysis should be conducted for the Project. The preliminary hazard analysis should incorporate all known hazards, and include:

- possible frequency of potential hazards, accidents, spillages and abnormal events occurring during all stages of the Project;
- the protocols and contact provisions for emergency services, should their services need to be provided;
- the possibility, impact and mitigation of potential protest activity associated with the project;
- identification of all hazardous substance to be used, stored, processed or produced and the rate of usage;
- potential wildlife hazards such as snakes and disease vectors;
- an outline of the public liability of the State for private infrastructure and visitors on public land;
- possible hazards, accidents, and abnormal events that may arise for the Project, both during construction and in operation should be described, including:
    - accidental release of hazardous goods or other materials;
    - explosions and fires associated with incidents arising from the Project activities;
    - seismic stability of the Project area;
    - vulnerability of the Project area to flooding, bushfire, and landslip;
    - workforce injuries; and
    - water contamination.

4.12.2 Risk assessment

A preliminary risk assessment for all components of the Project shall be undertaken as part of the EIS process in accordance with appropriate parts of AS/NZS Risk Management Standard 4360:1999.

The EIS should deal comprehensively with on-site risks. The Queensland Police Service is to be consulted in the development of options to minimise risks involving critical infrastructure protection and contamination of water within the project area.

External risks to the Project should also be considered. External risks from natural hazards could be determined on the basis of AS/NZS Risk Management Standard 4360:1999.

The study should assess risks during the construction, operational and decommissioning phases associated with the Project.

Analysis of the consequences of any major hazard events on safety and environmental damage in the Project area should be conducted, including:

- injuries and death to workers and to the public;

- direct harm to the environment as a result of project hazards; and
- effect on crops and livestock.

The analysis should examine the likelihood of these consequences being experienced, both individually and collectively.

Details should be provided on the safeguards that would be employed or installed to reduce the likelihood and severity of hazards, consequences and risks to persons, fauna and environmentally sensitive sites within and adjacent to the Project area. The information should include the reduced level of risk that would be experienced with these safeguards in place.

4.12.3 Emergency management plan

This section should provide an outline of the proposed emergency management procedures for the range of situations identified in the above risk assessment as providing measurable risks.

The following should also be presented:

- contingency plans to deal with hydrocarbon (e.g. diesel, lubricating oils) oil spills during construction, operation and maintenance of the project;
- contingency plans to account for natural disasters such as storms, floods and fires during the construction, operation and maintenance phases. The establishment of the suitable provision of water for fire fighting should be identified;
- emergency planning and response procedures that have been determined in consultation with State and regional emergency service providers including emergency services contact protocols for the Project; and
- plans for involvement of the relevant State agencies (such as the Queensland Ambulance Service) in relation to emergency medical response and transport and first aid matters.

4.13 Health and safety

4.13.1 Description of environmental values

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

4.13.2 Potential impacts and mitigation measures

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

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

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

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

4.14 Cumulative impacts

The purpose of this section is to provide clear and concise information on the overall impacts of the Project, and to discuss the interrelationship of these impacts. This is in addition to the discussion of cumulative impacts which feature in the relevant sections. The cumulative impacts as they relate to particular issues (e.g. air, water, cultural heritage, social, noise) may also be discussed in this section. These impacts should be considered over time because of the scale, intensity, duration or frequency of the impacts. In particular, the requirements of any relevant State Planning Policies, EPPs, National Environmental Protection Measures, the State Coastal Management Plan, the Reef Protection Plan, the Burdekin WRP and any relevant Integrated Catchment Management Plans should be addressed.

The methodology to be used to determine the cumulative impacts of the Project should be discussed. The methodology should detail the scope or range of variables to be considered including, where applicable, relevant baseline or other criteria upon which the incremental aspects of the Project should be assessed.

4.15 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 plans

This section of the EIS should present draft environmental management plans (EMPs) developed for the Project. Separate EMPs should individually address the discrete Project elements. The EMPs should be developed from and be consistent with the preceding information in the EIS.

An EMP should provide life-of-proposal control actions in accordance with agreed performance criteria for specified acceptable levels of environmental harm. In addition, EMPs should identify:

- potential impacts on environmental values;
- mitigation strategies;
- relevant monitoring;
- appropriate indicators and performance criteria;
- reporting requirements; and
- appropriate corrective actions, should an undesirable impact or unforeseen level of impact occur.

The aims of an EMP are to provide:

- commitments by the Proponents to practical and achievable strategies and design standards (performance specifications) for the management of the Project to ensure that environmental requirements are specified and complied with;
- an integrated plan for comprehensive monitoring and control of impacts;
- local, State and Commonwealth authorities, stakeholders and the Proponents with a common focus for approvals conditions and compliance with policies and conditions; and
- the community with evidence that the environmental management of the Project is acceptable.

The recommended structure of each element of the EMP is:

Element/issue:	Aspect of construction or operation to be managed (as it affects environmental values).
Operational policy:	The operational policy or management objective that applies to the element.
Performance criteria:	Measurable performance criteria (outcomes) for each element of the operation.
Implementation strategy:	The strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria.

Monitoring:	The monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing:	The auditing requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria.
Reporting:	Format, timing and responsibility for reporting and auditing of monitoring results.
Corrective action:	The action (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for action (including staff authority and responsibility management structure).

An EMP should commit to manage, enhance or protect identified environmental values. The commitments should contain the following components for performance criteria and implementation strategies:

- environmental protection objectives for enhancing or protecting each relevant value;
- indicators to be measured to demonstrate the extent to which the environmental protection objective is achieved;
- environmental protection standards (a numerical target or value for the indicator), which defines the achievement of the objective; and
- an action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
  a) continuous improvement;
  b) environmental auditing;
  c) monitoring;
  d) reporting;
  e) staff training; and
  f) a decommissioning program for land proposed to be disturbed under each relevant aspect of the proposal.

6 Conclusions and recommendations

The EIS should make conclusions and recommendations with respect to the proposal, based on the studies presented, the Environmental Management Plans and conformity of the proposal with legislative and policy requirements.

7 References

All references used in the preparation of the EIS should be presented in a recognised format such as the Harvard standard (refer to the Style Guide, Australian Government Publishing service).

8 Recommended appendices

8.1 Final Terms of Reference

The finalised Terms of Reference should be included as an Appendix to the EIS.

8.2 Development approvals

A list of the development approvals required by the Project such as approvals required under the Transport Infrastructure Act for any ancillary roadworks and encroachments (AWEs) within the State-controlled road reserves should be provided.

8.3 Consultation Report

A list of Advisory Bodies should be provided in a summary Consultation Report, which should also list the Commonwealth, State and Local government agencies consulted, and the individuals and groups of stakeholders consulted. A summary of the issues raised by these groups, and the means by which the issues have been addressed, should be provided in the text of the EIS.

The EIS 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.

Information about identifying affected parties (as defined by the EPBC Act) and interested and/or affected persons (as defined by the EP Act) should be included.

8.4 Study team

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

8.5 Technical data and baseline studies

Relevant supporting data and information generated from specialist studies undertaken as part of the EIS are to be included as appendices. These may include:

- geology;
- soil survey and land suitability studies;
- land use and land capability studies;
- waterway hydrology and groundwater;
- flora and fauna studies;
- air pollution, noise and vibration;
- road impact assessment (RIA) investigations;
- economic and social studies and/or cost-benefit analyses; and
- hazard and risk studies.

8.6 List of proponent commitments

A list of all commitments made by the Proponents in the EIS should be provided, together with a reference to the relevant section in the EIS.

8.7 Potential impacts on matters of National Environmental Significance

The EIS must provide a stand-alone report that exclusively and fully addresses the issues relevant to the matters of National Environmental Significance (NES) that were identified in the 'controlling provisions' when the Project was declared a controlled action under Part 3, Division 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The report must provide:

- a description of proposed action (as it would impact on NES matters);
- a description of the Affected Environment Relevant to the Controlling Provisions (i.e. describe the features of the environment that are NES matters protected under the EPBC Act);
- an assessment of Impacts on NES Matters and Mitigation Measures and consideration of compensationary or offset options; and
- specific reference to sections 1.7, 3.1 and 4.2 of the EIS.