



Linc Energy Ltd
Underground Coal Gasification
Gas to Liquids and Power Generation 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

PREAMBLE

Project Background

Underground Coal Gasification (UCG) is the conversion of solid coal to a gas in-situ by heating the coal and introducing a mix of oxidants (air/oxygen and steam) to cause gasification rather than combustion of the coal. Typically, two wells are drilled into the coal seam, one to inject the oxidants, the other to extract the resultant synthesis gas, or syngas (principally hydrogen and carbon monoxide). The gasification rate is controlled by airflow pressure and temperature. The syngas is cleaned of impurities and can be used for liquid fuels production, power generation, industrial heating and/or as feedstock for chemical manufacture.

The UCG process was developed in the former Soviet Union where it has been used for power generation for over 40 years, with two plants still in operation. UCG trials have been undertaken in Europe and America, as well as Australia at Chinchilla in Queensland by Linc Energy Pty Ltd.

Syngas can be converted from gas-to-liquid (GTL) via a Fischer-Tropsch reaction under a process that was developed in Germany in the 1920's. Sasol has been operating full-scale coal-to-liquids (CTL) synfuels plants using this technology since the 1950's and currently provides 25% of South Africa's transport fuel requirements.

The syngas can also be used to fuel a stand alone gas turbine generator, combined cycle power plant or any other industrial heat application. If used for electricity generation, the greenhouse gas emission intensity is significantly lower than from a conventional coal-fired power station. In addition, there is an opportunity to capture the CO₂ and store (sequester) this underground in deeper coal seams or within cavities produced during the UCG process. As such, UCG could offer an important contribution to the suite of clean coal technologies being investigated.

In 1999, Linc Energy established a pilot UCG facility within its Mineral Development Licence (MDL) 309, 20 kilometres south-west of Chinchilla, in southern Queensland. Linc Energy gasified approximately 35,000 tonnes of coal at a depth of 120 metres below surface during a 30-month test period, with the produced syngas being flared to the atmosphere.

Project Summary

Following the successful pilot project, Linc Energy now proposes to develop a commercial-scale UCG project, within mineral tenements held by the company in the Chinchilla area (see Figure 1). Linc Energy has stated that the proposal is based on "stranded" coal resources in the Surat Basin that are currently considered to be sub-economic because of coal quality, unfavourable deposit characteristics and/or distance from transport infrastructure.

Linc Energy has recently advanced plans for development of a demonstration GTL plant at the Chinchilla site and has re-ignited the pilot UCG facility, to test the commercial feasibility of the UCG-GTL process. The demonstration GTL plant, which will have a nominal production

capacity of 1-5 barrel per day (bpd) of synthetic fuel (diesel and aviation fuel), is expected to be constructed by the end of 2007. Approval to operate the demonstration plant will require amendments to the current environmental authority and approved work program for MDL 309 and is not part of the Project being assessed under this Environmental Impact Statement (EIS) process.

Subject to the outcome of the demonstration plant and feasibility study, Linc Energy proposes to develop a commercial-scale 20,000 bpd GTL plant and associated expansion of the UCG facility. Further expansions of the UCG-GTL facility up to 40,000 bpd capacity could follow the successful commercialisation of the site, based on identified coal resources within the MDL and surrounding Exploration Permit for Coal 635. Linc Energy proposes to apply for a mining lease(s), for the commercial stages of the Project.

In addition, Linc Energy proposes to develop a 200 megawatt (MW) combined cycle gas turbine power generation plant, which is expected to provide on-site power for the GTL plant and other equipment. It is proposed that surplus power to the Project's requirements would be sold to the National Electricity Market.

The "Project", the subject of this EIS, consists of the UCG facility, GTL plant (up to 40,000 bpd) and power plant (up to 200MW), and associated infrastructure.

Project Proponent

The Proponent for the Project is Linc Energy Limited ('Linc Energy'), a Queensland company based in Brisbane. Linc Energy was listed on the Australian Stock Exchange in May 2006, and was formed to develop and commercialise UCG in Australia. Linc Energy has entered into a number of commercial arrangements to advance the Project, including:

- The Skochinsky Institute (Russia), which invented the UCG process, will be the on-site technical advisors.
- Yersotigaz (Uzbekistan) - now 60% owned by Linc Energy, as operators since 1964 of the only commercial UCG power plant will provide intellectual property and expertise.
- Marubeni Corporation (Japan) will provide direct investment in the Project.
- MegChem (South Africa) will design the demonstration GTL plant.

Administrative Procedures for these Terms of Reference

On 17 May 2007, the Coordinator-General (CG) declared the Project to be a 'significant project', for which an Environmental Impact Statement (EIS) is required pursuant to section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). Matters considered by the CG in making this declaration included: information in the Initial Advice Statement prepared by Linc Energy; relevant planning schemes and policy frameworks; infrastructure impacts; employment opportunities; environmental effects; complexity of local, State and Commonwealth requirements; level of investment; and the project's strategic significance.

The declaration initiates the statutory environmental impact assessment procedure under Part 4 of the SDPWO Act, which requires the proponent to prepare an EIS for the Project.

On 12 July 2007, Linc Energy referred the Project to the Australian Government Minister for the Environment and Water Resources for a decision as to whether the Project constitutes a controlled action under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Referral No. 2007/3541). On 10 August 2007, the Minister determined that the proposal constitutes a 'controlled action' under section 75 of the Act, as there is likely to be a significant impact on matters of 'national environmental significance'. The controlling provisions under Part 3, Division 1 of the EPBC Act are: sections 18 and 18A (listed threatened species and communities).

As a consequence, the Project requires assessment and approval under the EPBC Act. The Australian Government has accredited the EIS process under the SDPWO Act under a bilateral agreement between the Australian and Queensland Governments, pursuant to section 87(1)(a) of the EPBC Act. This will enable the EIS to meet the impact assessment requirements under both the Australian and Queensland legislation.

The Department of Infrastructure and Planning (DIP) is managing the EIS process on behalf of the CG. DIP has invited relevant Australian, State and local government representatives and other relevant authorities to participate in the process as Advisory Agencies.

The first step in the impact assessment process is the development of Terms of Reference (ToR) for an EIS for the Project to satisfy the requirements of the SDPWO Act. The process involves the formulation of draft ToR that are made available for public and Agency comment. The CG had regard to all properly made submissions received on the draft ToR in finalising the ToR. This document represents the final ToR following public and Agency comment and was presented to Linc Energy.

Linc Energy will prepare an EIS to address the ToR. Once the EIS has been prepared to the satisfaction of the CG, a public notice will be placed in relevant newspapers. 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.

Linc Energy will be required to prepare a Supplementary EIS to address specific matters raised in submissions on the EIS. The CG will then prepare a report evaluating the EIS. The CG's Report will be provided to Linc Energy, the Minister for the Environment and Water Resources (under the EPBC Act) and be publicly notified by placing it on DIP's website.

To undertake the UCG components of the Project, Linc Energy will require both a mining lease under the *Mineral Resources Act 1989* (MRA), issued by the Queensland Governor in Council and an environmental authority (mining activities) under the *Environmental Protection Act 1994* (EP Act), issued by the Queensland Minister for Sustainability, Climate Change and Innovation. The GTL plant will require approval for a petroleum facility licence under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act). The CG's Report will be provided to the Ministers administering each of these acts.

The power generation plant and any elements of the Project outside the mining lease will require development approval under the *Integrated Planning Act 1997* (IPA). In this case, the assessment manager for any such development applications would be the relevant local government authority. The CG's Report will be provided to the assessment manager.

Consequently, the abbreviation 'EIS' used in these ToR should be interpreted as satisfying the impact assessment requirements of all relevant Queensland and Australian Government statutes for the Project, which include, but are not limited to, the SDPWO Act, EPBC Act, EP Act, MRA, P&G Act, IPA and *Transport Infrastructure Act 1994*.

Under s.45 of SDPWO Act, the CG's Report may state conditions for the proposed mining lease. If CG's conditions are included in the Report: the CG must give the MRA Minister a copy of the Report; and the conditions of the proposed mining lease are, subject to any inconsistency with native title issues conditions that have paramountcy under s.47 of SDPWO Act, taken to include the CG's conditions.

Similarly, the CG's Report may, under s.49 of SDPWO Act, state conditions for any draft environmental authority under the EP Act for the proposed environmental authority (mining lease). If conditions are included in the Report: the CG must give the EP Act Minister a copy of the Report.

In addition, the CG's Report may, under s.49B of SDPWO Act, state conditions for a proposed petroleum facility licence. If CG's conditions are included in the Report, the CG: must give the Minister administering the P&G Act a copy of the Report; and the conditions of the proposed petroleum facility licence are, subject to any inconsistency with native title issues conditions that have paramountcy under s.47 of SDPWO Act, taken to include the CG's conditions.

Further, the CG's Report may, under s.47B of SDPWO Act, state conditions for any draft environmental authority under the EP Act for the proposed environmental authority (petroleum activities). If conditions are included in the Report: the CG must give the EP Act Minister a copy of the Report.

Finally, if the Project involves development requiring an application for a development approval under IPA, the CG's Report may, under s.39 of SDPWO Act, 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 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 Report must:

- give reasons, if the Report states that development approval be refused; and
- be given to the assessment manager for the application by the CG.

Results of Consultation on these Terms of Reference

On 25 August 2007, advertisements were placed in The Weekend Australian, Brisbane Courier Mail and Toowoomba Chronicle newspapers inviting public comment on the Project's draft ToR. A similar advisement was also placed in the Chinchilla News and Murilla Advertiser on 30 August 2007. Release of the draft ToR was also notified on DIP's website from which the draft ToR could be downloaded. Hard copies of the draft ToR were also publicly available for inspection at the offices of the Chinchilla Shire Council and the State Development Centre in Toowoomba.

The period for receipt of submissions closed on 24 September 2007. A total of fourteen (14) submissions were received, including ten (10) from Queensland Government agencies, one (1) from a local government authority and three (3) from private companies. Copies of all submissions were forwarded to Linc Energy.

The content of all submissions has been reviewed and considered by the CG in finalising the ToR for the EIS for the Project. Amendments to the draft ToR, which have arisen from recommendations made in submissions, are referenced in this document as footnotes.

The following is a list of responses and submissions received on the draft ToR:

No.	Agency/Organisation	Date	Abbrev
1	Dept of Mines & Energy	19/09/07	DME
2	Dept of Natural Resources and Water	20/09/07	DNRW
3	Dept of Housing	21/09/07	DoH
4	Dept of Primary Industries & Fisheries	21/09/07	DPIF
5	Origin Energy	24/09/07	Origin
6	Dept of Main Roads	24/09/07	DMR
7	Dept of Emergency Services	24/09/07	DES
8	Queensland Health	24/09/07	QH
9	Queensland Transport	24/09/07	QT
10	Arrow Energy	24/09/07	Arrow
11	Queensland Gas Co.	24/09/07	QGC
12	Dept of Communities*	24/09/07	DoC
13	Environmental Protection Agency	24/09/07	EPA
14	Chinchilla Shire Council*	09/10/07	CSC

* Note: these government agencies indicated that they did not have any comments on the draft ToR for the Project

The ToR provides information in two broad categories:

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

Part B – Specific requirements – Content of the EIS.

The Coordinator-General's contact details for any further enquiries are:

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ABBREVIATIONS

The following abbreviations have been used in this document:

ACH Act	<i>Aboriginal Cultural Heritage Act 2003 (Qld)</i>
CHMP	Cultural Heritage Management Plan
CG	The Coordinator-General of the State of Queensland
CLR	Contaminated Land Register
CO ₂	Carbon dioxide
DEW	Australian Department of Environment and Water Resources
DMR	Queensland Department of Main Roads
DME	Queensland Department of Mines and Energy
DNRW	Queensland Department of Natural Resources and Water
DIP	Queensland Department of Infrastructure and Planning
DPIF	Queensland Department of Primary Industries and Fisheries
EIS	Environmental Impact Statement, as defined by Part 4 of the <i>State Development & Public Works Organisation Act 1971</i>
EMP	Environmental Management Plan
EMR	Environmental Management Register
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
EPA	Queensland Environmental Protection Agency
EPBC Act	<i>Environment Protection & Biodiversity Conservation Act 1999 (C'th)</i>
EPP	Environmental Protection Policy
GQAL	Good Quality Agricultural Land in "State Planning Policy 1/92: Development and the Conservation of Agricultural Land"
GTL	Gas to liquids plant
IAS	Initial Advice Statement, as defined by Part 4 of the <i>State Development & Public Works Organisation Act 1971</i>
IPA	<i>Integrated Planning Act 1997 (Qld)</i>
MDL	Mineral Development Licence, under the <i>Mineral Resources Act 1989</i>
MNES	Matters of National Environmental Significance, as under the EPBC Act
MRA	<i>Mineral Resources Act 1989 (Qld)</i>
Mtpa	Million tonnes per annum
NCA	<i>Nature Conservation Act 1992 (Qld)</i>

NO _x	Nitrogen oxides
NTRB	Native Title Representative Body
P&G Act	<i>Petroleum and Gas (Production and Safety) Act 2004</i> (Qld)
SDPWO Act	<i>State Development & Public Works Organisation Act 1971</i> (Qld)
SO _x	Sulphur oxides
SPP 1/03	State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide
ToR	Terms of Reference as defined by Part 4 of the <i>State Development & Public Works Organisation Act 1971</i>
UCG	Underground coal gasification

Part A: INFORMATION AND ADVICE ON PREPARATION OF THE EIS

1. INTRODUCTION

These Terms of Reference (ToR) are for an Environmental Impact Statement (EIS) for the Linc Energy Underground Coal Gasification (UCG), Gas-to-Liquids (GTL) and power generation facilities at Chinchilla (the 'Project'). The ToR have been prepared in accordance with the requirements of Sections 29 and 30 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

The objective of the ToR is to identify those matters that should to be addressed in the EIS for the Project that has been described in the Initial Advice Statement (IAS) and which was declared to be a 'significant project' by the CG on June 2007. The Project has also been determined to be a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the EIS will be conducted under the Bilateral Agreement between the Australian and Queensland Governments.

In order to clarify the nature and level of investigations that are envisaged in the ToR, the Proponent may consult further with relevant government bodies (known as Advisory Agencies), peak community interest organisations and groups as necessary during the preparation of the EIS to ensure that the ToR are addressed.

Culturally sensitive information should not be disclosed in the EIS or any associated documents and the disclosure of any such information should only be in accordance with the arrangements negotiated with the traditional custodians. Confidential information to be taken into consideration in making a decision on the EIS should be marked as such and included as a separate attachment to the main report.

An executive summary should be prepared and included in the EIS. It should be a separable document that can be a stand alone document.

2. EIS OBJECTIVES

The objective of the EIS is to ensure that all potential environmental, social and economic impacts of the Project are identified and assessed and, where possible, how any adverse impacts would be avoided. Direct, indirect and cumulative environmental impacts must be fully examined and addressed.

The EIS should be a self-contained and comprehensive document that provides sufficient information for an informed decision on the potential impacts of the Project, and the management measures employed to mitigate adverse impacts. The EIS documentation should provide information for the following persons and groups, as the Project "Stakeholders".

- Affected Persons - groups or persons with rights or interests in land, as defined under s.38 of the *Environmental Protection Act 1994* (EP Act): an outline of the effects of the

proposed Project on that land, including access arrangements.

- Interested Persons – groups or persons identified by the Proponent, as defined under s.43(3)(b) of the EP Act: a basis for understanding the Project, prudent and feasible alternatives, affected environmental values, potential impacts that may occur and measures to mitigate potential adverse impacts.
- Government agencies and referral bodies: a framework for decision-makers to assess the environmental aspects of the proposed Project with respect to legislative and policy provisions, and based on that information, to make an informed decision on whether the Project should proceed or not, and if so, subject to what conditions, if any.
- The Proponent: a mechanism by which the potential environmental impacts of the Project are identified and understood, including information to support the development of management measures, such as an Environmental Management Plan (EMP), to mitigate the effects of adverse environmental impacts of the development.

Completion of the EIS in accordance with the final ToR does not mean that the Project will be approved.

3. GENERAL EIS GUIDELINES

The EIS is to provide the Stakeholders with sufficient information to understand the type and nature of the Project, the potential environmental, social and economic impacts, and the measures proposed by the Proponent to mitigate all adverse impacts on the natural, built and social environment. It should be recognised that representatives of state and local governments, special interest groups and the general public will have an interest in the EIS.

All phases of the Project should be described in the EIS including pre-construction, construction, operation and decommissioning, including final rehabilitation. Direct, indirect and cumulative environmental impacts should be identified and assessed with respect to the environmental values of the Project area.

Specifically the EIS should provide:

- An executive summary of the potential environmental impacts of the Project;
- An overview of the Proponent and its existing operations;
- A description of the entire Project, including associated infrastructure requirements;
- A description of feasible alternatives capable of substantially meeting the Project's objectives;
- An outline of the various approvals required for the Project to proceed;
- Descriptions of the existing environment, particularly where this is relevant to the assessment of impacts;
- Measures for avoiding, minimising, managing and monitoring adverse impacts, including a statement of commitment to implement the measures;
- Rigorous assessment of the risks of adverse and beneficial environmental impacts arising from the Project and relevant alternatives on environmental, social and economic values, relative to the 'no Project' scenario;

- Any information derived from baseline and predictive studies, the required extent of which will be commensurate to risks;
- A description of stakeholder consultation undertaken; and
- Responses to issues raised during public and stakeholder consultation.

Consideration should be given to undertaking baseline and predictive studies to address all controlling provisions triggered by the Project.

The main EIS document needs to be supported by appendices containing relevant data, technical reports and other sources of analysis. In preparing the EIS, the approach to be adopted requires that:

- Predictions of environmental impacts are based on scientifically supported studies;
- The EIS is to present all technical data, sources or authority and other information used to assess impacts;
- The methods used to undertake any specialist studies are outlined, together with any relevant assumptions and professional or scientific judgements;
- The scientific reliability of investigations and predictions is indicated, including the estimated degree of certainty or, if possible, statistical confidence wherever appropriate;
- Proposed measures to mitigate and manage identified issues are described and evaluated; and
- Residual impacts that are not quantifiable are described qualitatively, in as much detail as reasonably practicable.

The assessment of all environmental impacts needs to encompass both potential impacts on and uncertain risks to the environment. The level of investigation of potential impacts or particular risks needs to be proportionate to both the severity of the potential consequences of possible events and the likelihood of those events occurring.

Specific impacts requiring investigation are set out in Part B. However, the EIS will need to address other issues or aspects that may emerge during the investigations and preparation of the EIS. Ultimately, it is the Proponent's responsibility to ensure that adequate studies are undertaken and reported.

4. STAKEHOLDER CONSULTATION

The Proponent should undertake a comprehensive and inclusive program of consultation with the Stakeholders throughout the EIS process. The consultation program should provide stakeholders with the opportunity to obtain information about the Project, to raise issues and express their concerns and to receive feedback on how the Proponent intends to address the issues and mitigate all adverse impacts of the Project.

Consultation with the Advisory Agencies should be the principal forum for identifying legislation, regulations, policies and guidelines relevant to the Project and EIS process.

Appropriate communication processes, possibly including information bulletins and discussion

papers, should be used to disseminate information about the Project to a wider audience and to inform the Stakeholders of the Proponent's progress in the EIS process, in particular on specific issues.

The Proponent is encouraged to provide opportunities for the general public to obtain information about, and comment on, the Project through such forums as public information sessions.

As part of this EIS process consultation will also be undertaken to better understand the social impacts of the proposed Project and opportunities for mitigation of those impacts.

5. GENERAL EIS FORMAT

The EIS should be written in a format matching the ToR or include guidelines (preferably as an appendix) describing how the EIS responds to the ToR. The EIS is to include appendices containing:

- A copy of the final ToR;
- A list of persons, interest groups and agencies consulted during the EIS;
- A list of advisory agencies consulted with an appropriate contact; and
- The names of, and work done by, all personnel involved in the preparation of the EIS.

Maps, diagrams and other illustrative material should be included in the EIS to assist in the interpretation of the information.

The EIS should be produced on A4-size paper capable of being photocopied, with maps and diagrams on A4 or A3 size. The EIS should also be produced on CD ROM. CD ROM copies should be in ADOBE® PDF format for placement on the internet. All compression must be down-sampled to 72 dpi (or ppi). PDF documents should be no larger than 2 MB in file size. Text size and graphics files included in the PDF document should be of sufficient resolution to facilitate reading and enable legible printing.

The final nature and number of EIS copies required to be submitted and made available, should be discussed and agreed with the CG in the early stages of the EIS process.

Part B: SPECIFIC REQUIREMENTS – CONTENTS OF THE EIS

The EIS should include the following sections, but need not be limited to these sections or inferred structure.

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 adverse impacts.

The Executive Summary should 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 Agencies;
- 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; and
- Clear maps of the proposed Project location.

GLOSSARY OF TERMS

A glossary of technical terms and acronyms should be provided.

1. INTRODUCTION

The introduction should clearly explain the purpose of the EIS, to whom it is directed and contain an overview of the structure of the document.

1.1 Project Proponent

This section should describe the relevant experience of Linc Energy, including the nature and extent of business activities, experience and qualifications, and environmental record including Linc Energy's environmental policy.

1.2 Project Description

This section should provide a brief description of the key elements of the Project (particularly the UCG, CTL and power generation processes and facilities), including associated infrastructure requirements with specific locations illustrated on maps. Proximity of the Project to the State-controlled road network, (with road names visible) should be included in any maps provided.

1.3 Project Objectives and Scope

This section should provide a statement of the objectives of the Project and a brief outline of the events leading up to the Project's formulation. Information should be provided on the envisaged time scale for implementation, project life, anticipated establishment costs and actions already undertaken within the Project areas. The current status of the Project should be described, and an outline of the relationship of the Project to other developments or actions to which it may relate.

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

1.4 Project Need, Costs and Benefits

The EIS should describe the justification for the Project in a regional, state and national context. This section should also describe:

- The rationale and justification for the Project in relation to alternative fuels, and greenhouse gas emissions and climate change;
- The Project's compatibility with the Queensland and National Greenhouse Strategies, Australian Government Ecological Sustainable Development policy, Queensland Energy Policy, National Strategy on Conservation of Australia's Biological Diversity and any other relevant policy;
- Expected local, regional, state or national benefits; and

- The Project's technical feasibility and commercial viability.

This section should also summarise:

- The economic costs and benefits to other industries and the wider community derived from the Project, including employment and spin-off business development;
- Increased demand on natural resources; and
- Regional socio-economic impacts including cultural impacts, community disruption, related land use changes, employment, skills development and any workforce accommodation issues.

1.5 Alternatives to the Project

This section should describe any prudent and feasible conceptual, technological and locality alternatives to the Project, or specific elements of the Project. The consequences of not proceeding with the Project must be discussed. Alternatives should be discussed in sufficient detail to justify the ultimate selection of the preferred option. Compliance with government policy and with the principles and objectives of ecologically sustainable development should be included in this discussion. Reasons for selecting preferred options should be delineated in terms of technical, commercial, social and natural environment aspects.

1.6 The Environmental Impact Assessment Process

1.6.1 Methodology of the EIS

This section should make clear the objectives of the EIS process under the SDPWO Act and EPBC Act, development approval under the *Integrated Planning Act 1997* (IPA), *Mineral Resources Act 1987* (MRA), *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) and the *Environmental Protection Act 1994* (EP Act). This section should also include a description of the impact assessment process steps, timing, and decisions to be made for relevant stages of the Project.

In particular, this section should outline mechanisms in the process for public input and the public release of an EIS that will specify all responses to stakeholder submissions. It should be noted that it is necessary for Linc Energy to undertake wide consultation as part of the impact assessment process.

1.6.2 Objectives of the EIS

This section should provide a statement of the objectives of the environmental impact assessment process, detail how the relevant legislation will be addressed and highlight the EIS as the key environmental document for providing advice to decision makers considering approvals for the Project. It should be highlighted that the purpose of the EIS is to:

- Provide public information on the need for, and likely effects of the Project, as well as providing an opportunity for involvement and consultation on the Project;
- Set out acceptable standards and levels of impacts (both beneficial and adverse) on

environmental values;

- Demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values; and
- The relationship of other Project environmental management planning documentation, conditions, approvals and environmental authorities should be discussed in relation to the EIS.

Discussion of options and alternatives is a key aspect of the EIS.

1.6.3 Submissions

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

- How to make a submission;
- What form the submission should take; and
- When the submission must be made to gain standing for any appeal process.

1.7 Public Consultation Process

This section should outline the public consultation process that has taken place during EIS preparation and the results of such consultation. It should outline any further opportunities for public input.

The public consultation program should provide opportunities to encourage and facilitate active community involvement and education through an inclusive program that identifies the broad issues of concern to the Stakeholders at all stages including project planning, construction, commissioning, operations and final decommissioning.

The key objectives of the consultation program should be to:

- Inform the Stakeholders about the Project proposal;
- Seek an understanding of Stakeholder concerns about the Project;
- Explain the impact assessment research methodology and how public input might influence the final recommendations for the Project;
- Provide an understanding of the regulatory approval process;
- Seek local information and input into the Project; and
- Provide the community with a sense of ownership in the Project.

The public consultation program should be incorporated into the EIS and provide ongoing opportunities for community involvement, feedback and education. Details should be provided on programs for public meetings, interest group meetings, production of regular summary information and updates and any other consultation mechanisms for encouraging and facilitating active public consultation. A list of the Stakeholders, which includes information on consultation with each party, should be included.

The Indigenous component of the public consultation program should be underpinned by the following guiding principles:

- Engagement that is inclusive rather than exclusive;
- Engagement that is geographically specific;
- Engagement that uses appropriate language and media; and
- Engagement that takes into account the education and entry level of Indigenous participants.

In particular, the EIS should describe:

- Linc Energy's program for communicating and consulting with the Stakeholders during the course of the EIS preparation and include the information provided and the methods for engaging with the Stakeholders in the assessment of social and economic impacts; and
- The outcomes of consultation undertaken as part of specific impact studies, the issues and suggestions of the Stakeholders or members of the public (by theme and source, rather than individually) and the response made by Linc Energy in the context of either the EIS studies or the refined Project proposal.

1.8 Project Approvals

1.8.1 Relevant Legislation and Policy Requirements

This section should identify the principal development approvals for the Project, and specify the legislation and policies controlling the approvals process. Reference should be made to the SDPWO Act, EPBC Act, MRA, P&G Act, IPA, *Transport Infrastructure Act 1994*, *Land Act 1994*, *Vegetation Management Act 1999*, *Water Act 2000* and other relevant Australian and Queensland laws. Requirements of the *Native Title Act 1993* should be covered.

The EIS should describe the approval process resulting from the gazettal of this Project as a significant project pursuant to the SDPWO Act and outline the linkage to other relevant State and Australian legislation. This outline should describe the public notification processes and appeal rights that will be available in the anticipated approval processes. The EIS should indicate the level of approvals anticipated by Linc Energy for each Project element in order that approval agencies are able to determine the completeness of the information presented and the scope to generate the anticipated approvals.

A description of the Environmentally Relevant Activities necessary for each aspect of the Project should be given. The EIS should provide a list of the approvals required for the Project, including any amendments to existed licences/authorities held in relation to current activities on the Project site. In addition, local government planning controls, local laws and policies applying to the development should be described.

This section should identify all relevant State, regional and local planning polices and plans and discuss how the Project complies with these policies and plans. This section should outline the

Project's consistency with existing land uses or town planning criteria.

1.8.2 Planning Processes and Standards

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

1.9 Accredited Process for Controlled Actions under Australian Legislation

The Project is a controlled action under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and a significant project under the SDPWO Act. The EIS will be developed pursuant to the Bilateral Agreement between the Australian and Queensland Governments for the purposes of the Australian Government's assessment under the EPBC Act.

The EIS should address potential impacts on the matters of national environmental significance (MNES) that were identified in the 'controlling provisions' when the Project was determined to be a controlled action. As a minimum requirement, the EIS should provide separate discussions under sub-headings in the relevant sections that describe the values and address the potential impacts on MNES (see Section 3.3) that exclusively address those issues relevant to the controlling provisions. The impacts should also be assessed in the context of how well the ecological values are represented and protected in the region.

Alternatively, a stand-alone report could be provided as an appendix to the EIS that exclusively and fully addresses the issues relevant to the controlling provisions. As an appendix, the report should follow the following template outline:

1. Introduction.
2. Description of proposed action (as it would impact on MNES).
3. Description of the affected environment relevant to the controlling provisions (i.e. describe the features of the environment that are MNES protected under the EPBC Act).
4. Assessment of impacts on MNES and mitigation measures.
5. Conclusions.
6. References.

2. DESCRIPTION OF THE PROJECT

The objective of this section of the EIS is to describe the Project through its lifetime of construction, operation and decommissioning. The Project description also allows further assessment of which approvals may be required and how they may be managed through the life of the Project.

2.1 Overview of Project

The EIS should provide an overview of the Project to put it into context. This section should include a description of the key components of the Project through the use of text and design plans where applicable; the expected cost and overall duration and timing of the Project; and employment opportunities for the construction and operational phases of the Project. A summary of any environmental design features of the Project should be presented.

2.1.1 *Underground Coal Gasification*

This section should provide a description of the UCG process and the layout of key components including:

- The UCG methods to be used, including the major equipment to be used in the various components of the operation;
- The use of different techniques in areas of different topographic or geo-technical character;
- Description of the drilling techniques, and in-situ ignition methods;
- Description of methods to be used to ensure that the gasification process (including any zones of influence or contamination) does not extend beyond the mining tenure boundaries. Reference should be made to the experiences acquired from the Chinchilla UCG demonstration project;
- Description of key plant and equipment, raw materials and chemicals to be used and storage of compressed gases;
- Indicative process flow-sheets should be provided showing material balances for the UCG process, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams;
- Description of the residues and fluids in the UCG chamber following shutdown and extinguishment;
- The quantity of coal to be utilised annually, including any proposed ramping of production or staging of development; and
- Description of the quantities and characteristics of the products produced on an annual basis.

Specific details should be provided on the information and experience gained from demonstration of UCG within MDL309 in terms of following:

- The ability to control the underground combustion process, particularly shutdown and extinguishment, including details of the method(s) used, timeframe and any difficulties (foreseen or otherwise) with extinguishing the fire;
- Ground subsidence; and
- Groundwater contamination, including monitoring methods used and proposed for the Project.

In addition, the EIS should provide information on the following matters in relation to the proposed UCG activities:

- An outline of the coal resource base and proposed Project life;
- The extent and nature of any proposed ongoing exploration or geological or geo-technical evaluation within the Project area that may be required over the life of the Project;
- The proposed sequence and timing of utilising the coal resource within the Project area;
- The interaction with existing and proposed petroleum activities within the Project area; and
- The area disturbed at each major stage of the Project.

2.1.2 Gas-to-Liquids Plant

This section should provide a description of the Fischer - Tropsch reactor (GTL) process and the layout of key components of the GTL plant including:

- Concept and layout plans indicating the proposed buildings, structures, plant and equipment associated with the process;
- Description of key plant and equipment, processes, capacities and raw materials to be used;
- Indicative process flow-sheets showing material balances for the processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams; and
- Description of the types, quantities and characteristics of the products produced on an annual basis.

This section should also describe and show on plans (at an appropriate scale) the proposed methods and facilities to be used for product storage and for transferring product from the GTL processing plant to the storage facilities, and from the storage facilities to the transport facilities. Any environmental and safety design features of these facilities, including bunding of storage facilities should be discussed.

2.1.3 Power Generation Facilities

This section should provide a description of the power generation facilities. Specific details should be provided of the following:

- Location of the power plant;
- Design, capacity and proposed construction of the power plant;

- Source of fuel, including any back-up fuel supply;
- Chemicals to be used; and
- Description of the amount of electricity generated and how it is to be transmitted within the site and the electricity grid.

2.2 Site Location

The regional and local context of the Project should be described and illustrated on maps at suitable scales. Real property descriptions of the Project site should be provided. Maps should show the precise location of the Project area, and in particular:

- The location of the coal resource to be explored and developed;
- The location and boundaries of land tenures, in place or proposed, to which the Project area is, or will be subject;
- The location and boundaries of mining and petroleum tenures, granted or proposed, to which the Project area is, or will be subject;
- The location and boundaries of the Project footprint showing all key aspects, including UCG facilities, GTL plant, power station, other associated plant and building locations, materials storage areas, watercourses, water storages, bridges, culverts, areas of fill, hardstands etc.;
- Any part of the coal resource not intended to be gasified and any part of the resource that may be sterilised by the proposed Project operations;
- The location of all proposed Project transport infrastructure for both inputs and outputs for each element of the Project;
- The location of any proposed buffers surrounding the working areas; and
- The identification of all site access points to, from and within the Project on maps, to assist in the assessment of emergency planning.

Consideration should be given to providing a rectified air photo enlargement to illustrate components of the Project in relation to the land and mining tenures and natural and built features of the area.

2.3 Construction Activities

The extent and nature of the Project's construction phase should be described. The description should include:

- A description of the pre-construction activities;
- Indicative construction timetable, including expected commissioning and start-up dates and hours of operation;
- Management of weed and plant-matter cleared from sites with detailed information provided in Section 3.3.2;
- Management of soil during construction, with detailed information provided in Section 3.2.3;
- Process inputs, handling and storage including an outline of procedures for loading and unloading materials and contingency plans for spillages;

- Cleanup and restoration of areas used during construction, including camp sites and storage areas; and
- For parcels of land that are subject to a Notable Activity or affected by a Hazardous Contaminant, site investigations may be required.

2.4 Operations

This section should describe the activities involved in commissioning all aspects of the Project.

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

- A description of plant and equipment to be employed;
- The capacity of plant and equipment; and
- Chemicals to be used.

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

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

2.5 Decommissioning and Rehabilitation

This section should present the strategies and methods for decommissioning of the Project, in terms of the removal of plant, equipment, structures and buildings and the methods proposed for the stabilisation of the affected areas. Information should be provided regarding decommissioning and rehabilitation of the plant site, removal of processing plant, rehabilitation of concrete footings and foundations, hardstand areas and storage tanks (including any potential for reuse of these facilities). Information should be provided on how buildings and structures would be removed or made safe, if left in-situ. Options and methods for the disposal of wastes from the demolition of plant and buildings should be discussed in sufficient detail for their feasibility and suitability to be established.

A description of the casing and plugging methods used on decommissioned injection/production wells should also be provided. Any long-term risks that require management post-closure should be outlined.

Final rehabilitation of the Project sites should be discussed in terms of ongoing land use suitability, management of any residual contaminated land and other land management issues. The strategic approach to progressive and final rehabilitation, with a view to minimising the amount of land disturbed at any one time, should be described. This description should also

detail the monitoring program to be used to ensure rehabilitation goals are met.

Where dams are to be constructed, proposals for the management of these structures after the completion of the project should be given. Also, the final drainage and seepage control systems and long-term monitoring plans should be described. Any future proposed disturbance to waterways and associated fisheries resources as a result of decommissioning activities should be described.

A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed.

Detail of the impacts of the preferred rehabilitation strategy should be discussed in the appropriate subsections of Section 3 (Environmental values and management of impacts) particularly with regard to such issues as final landform stability (Section 3.2.5), rehabilitation of flora (Section 3.3.2) and the long-term quality of water in any final voids (Section 3.4.1). Implications for the long-term use and fate of the site should also be addressed, particularly with regard to the on-site disposal of waste and the site's inclusion on the Environmental Management Register or Contaminated Land Register.

2.6 Associated Infrastructure Requirements

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

2.6.1 Transport

This section should provide a brief overview of transport requirements for the Project during the construction, operation and decommissioning phases, including for the transport of plant, equipment, products, wastes and personnel. The description should address the use of existing transport infrastructure (road, rail and port) and all requirements for the construction, upgrading or relocation of any transport related infrastructure, including new roads, road alignments, or proposed road closures.

Details of proposed use of rail for transport of materials, products or wastes to or from the Project site should be discussed. In relation to shipping of products, details of the number of ships and their size should be documented.

Full details of transport volumes, modes and routes should be provided in accordance with Section 3.8 Transport.

2.6.2 Water Supply and Storage

The water resource requirements of the Project should be critically determined including the quality and quantity of all water supplied to the site. In particular, the proposed and optional sources of water supply should be described (e.g. bores, any surface storages such as dams and weirs, municipal water supply pipelines etc).

Estimated rates of supply from each source (average and maximum rates) should be given. Any proposed water conservation and management measures should be described. Factors such as potential on-site efficiencies, water conservation and re-use strategies should be evaluated. Use of water in-situ during the UCG process should be quantified.

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

Consideration should be given to any water allocation schemes or management plans in relation to any proposals to utilise sources of surface water and groundwater.

The EIS should describe the site layout plans for the coal gasification and power generation components of the Project, which incorporate requirements and conceptual plans for stormwater management structures, including descriptions of any discharge requirements for both the construction and operational stages. This should include proposals for drainage structures and dams and an overall site water balance. The topography of the site and adjacent areas should be discussed if any run-off is expected to leave the site. Full details of water management should be presented in accordance with Section 3.4 Water Resources.

2.6.3 Sewerage

The EIS should describe the amount and nature of sewage generated for on-site or off-site treatment and disposal, and the sewerage infrastructure required by the Project. Site layout plans should be provided, which incorporate requirements and conceptual plans for sewage management facilities, including descriptions of any discharge requirements for both the construction and operational stages.

If it is intended that industrial effluent or relatively large amounts of domestic effluent are to be discharged into an existing sewerage system, the capacity of the existing system to accept the effluent should be assessed.

2.6.4 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 location of any easements should be shown on an infrastructure plan. Energy conservation should be briefly described in the context of any Australian, state and local government policies.

Timeframes should be provided for the anticipated dates for the commencement of construction of supply facilities, testing and final commissioning, including time lines for the development of the proposed combined cycle power generation plant.

2.6.5 Telecommunications

The EIS should provide details of the telecommunication requirements for the Project, including sources and methods. This section should also describe any impacts on existing telecommunications infrastructure (such as optical cables, microwave towers, etc.) and identify the owners of that infrastructure.

2.6.6 Workforce and Accommodation

This section should describe the number of personnel to be employed, the skills' base of the required workforce and the likely sources (i.e. local, regional or overseas) for the workforce during the construction and operational phases for each component of the Project. The estimated number of people to be employed during construction and operations and arrangements for their transport to and from the Project areas, including the proposed use of regional or charter air services should be provided.

Reference should be made to the expected cumulative impacts on local workforce and accommodation needs the Project would have in relation to other major projects, which are currently occurring or planned for the region. This information should also include the timing of employees travelling from larger urban centres, detailing likely routes on the State-controlled and local government road networks.

Estimates should be provided according to occupational groupings and variations in the workforce numbers for the duration of the Project. The information should show anticipated peaks in worker numbers during the construction period.

The EIS should provide an outline of recruitment schedules and policies for recruitment of workers, addressing recruitment of local and non-local workers.

This section should also discuss an accommodation strategy for the construction workforce that addresses the estimated housing needs of both single and accompanied construction workers. This should include details of the size, location and management of any temporary worker accommodation that will be required either on-site or off-site. Maps should be included as necessary to illustrate the site and should include the location of any proposed construction workers' accommodation on-site or in the vicinity of the Project. The strategy should also include details of the operational workforce and how such accommodation is proposed to be supplied.

If camp sites are to be used to accommodate the workforce, details on the number, location (shown on a map), proximity to the construction site and typical facilities for these sites should be provided. Information should include data relating to facilities for:

- Food preparation and storage;

- Ablution facilities;
- Vector and vermin control;
- Fire safety;
- Dust and noise control in relation to proximity of camp site to the construction area.
- The service personnel required to maintain the camp and the supply of services to each construction camp; and
- Local government approvals required for establishment and operation of such camps should be outlined.

2.6.7 Other Infrastructure

The EIS should include a description 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 technical workshops and laboratories.

3. ENVIRONMENTAL VALUES & MANAGEMENT OF IMPACTS

The functions of this section of the EIS are to:

- Describe the existing environmental values of the area which may be affected by the Project. Environmental values should be described by reference to background information and studies, which should be included as appendices to the EIS;
- Describe the potential adverse and beneficial impacts of the Project on the identified environmental values. Any likely environmental harm on the environmental values should be described;
- Describe any cumulative impacts on environmental values caused by the Project, either in isolation or by combination with other known existing or planned sources of contamination;
- Present environmental protection objectives and the standards and measurable indicators to be achieved; and
- Examine viable alternative strategies for managing impacts. These alternatives should be presented and compared in view of the stated objectives and standards to be achieved. Available techniques, including best practice, to control and manage impacts to the nominated objectives should be discussed.

This section should detail the environmental protection measures incorporated in the planning, construction, operations, decommissioning, rehabilitation and associated works for the Project. Measures should prevent, or where prevention is not possible, minimise environmental harm and maximise socio-economic and environmental benefits of the proposal. Preferred measures should be identified and described in more detail than other alternatives.

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

It is recommended that the EIS follow the heading structure shown below. The mitigation measures, monitoring programs, etc., identified in this section of the EIS must be used to develop the Environmental Management Plan (EMP) for the Project (see Section 4).

3.1 Climate

This section should describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect management of the Project, including air quality within the region of the Project.

Extremes of climate (droughts, floods, cyclones, etc) should also be discussed with particular reference to water management at the Project site. The vulnerability of the area to natural or induced hazards, such as floods and bushfires, should also be addressed. The relative frequency and magnitude of these events should be considered together with the risk they pose to management of the Project.

The EIS should provide an assessment of the Project's vulnerabilities to climate change and describe possible adaptation strategies for the activity including:

- A risk assessment of how changing patterns of rainfall and hydrology, temperature and extreme weather may affect the viability and environmental management of the Project;
- The preferred and alternative adaptation strategies to be implemented; and
- Commitments to undertaking, where practicable, a cooperative approach with government, other industry and other sectors to address adaptation to climate change.

The potential impacts due to climatic factors should be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion should be addressed in Section 3.2. The impacts of storm events on the capacity of waste containment systems (e.g. site bunding/stormwater management and tailings dams) should be addressed in Section 3.9 with regard to contamination of waterways and in Section 3.3 with regard to the design of the waste containment systems. The impacts of wind, rain, humidity and temperature inversions on air quality should be addressed in Section 3.5.

3.2 Land

This section should detail the existing land environment for all areas associated with the Project, including the coal gasification and power generation components, pipeline, and any new permanent (e.g. compressors) or temporary (e.g. accommodation camps) facilities constructed for the Project. 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 sites and adjacent areas.

3.2.1 Topography & Geomorphology

3.2.1.1 Description of Environmental Values

Maps should be provided locating the Project elements in both regional and local contexts. The topography of the Project site should be detailed with contours at suitable increments, shown with respect to Australian Height Datum. Commentary on the maps should be provided highlighting the significant topographical features.

The environmental values of the cultural landscapes of the affected area, in terms of the physical and cultural integrity of the area, should also be described.

3.2.1.2 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 features as a result of the Project. The objectives to be used for the Project in re-contouring and landscaping should be described. Consideration should be given to the use of appropriate native plant species during any landscaping and re-vegetation.

3.2.2 Geology

3.2.2.1 Description of Environmental Values

The EIS should provide a description, map and a series of cross-sections of the geology of the Project site, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance. The general suitability of the Project site overburden material for road building should be discussed briefly.

Geological properties of all Project sites which may influence stability, occupational health and safety, rehabilitation programs, or the quality of waste water leaving any area disturbed by the Project should be described.

This section should also consider the geology underlying any proposed infrastructure corridors for product or materials transport, electricity easements, pipeline easements and other infrastructure outside the mining lease. Of particular interest is any other possible coal, petroleum, gas or other mineral resource that may be impacted or sterilised by the infrastructure.

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

The location, tonnage and quality of the coal resources within the Project area should be described in detail and, where possible, should be presented on a 'seam by seam' basis and include the modifying factors and assumptions made in arriving at the estimates. The resources should be estimated and reported in accordance with the Australasian code for reporting of mineral resources and ore reserves (the JORC Code - available at www.jorc.org/main.php) and the principles outlined in the Australian guidelines for the estimating and reporting of inventory coal, coal resources and coal reserves (available at www.jorc.org/pdf/coalguidelines.pdf) as appropriate.

3.2.2.2 Potential Impacts and Mitigation Measures

The EIS should analyse the effectiveness of the UCG proposal in achieving the optimum utilisation of the coal resources within the Project area and consider its impacts on other resources. It should demonstrate that the UCG proposal will 'best develop' the coal resources, minimise resource wastage and avoid any unnecessary sterilisation of these or any other of the State's coal, mineral, and petroleum (including gas and coal seam methane) resources that may be impacted upon or sterilised by the mining activities or related infrastructure.

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

3.2.3 Soils

3.2.3.1 Description of Environmental Values

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

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

The requirement for soils mapping in terms of area and mapping scale should follow the “Queensland Department of Mines and Energy: Technical Guidelines for Environmental Management of Exploration and Mining in Queensland, 1995”, specifically Section 6.1 which is headed “Land Suitability Assessment Techniques”. These guidelines recommend that disturbed areas be mapped more intensively than non-disturbed areas and provide guidance on acceptable mapping scale and site intensity.

3.2.3.2 Potential Impacts and Mitigation Measures

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

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

- Areas cleared of vegetation;
- Waste dumps;
- Stockpiles;
- Dams, banks and creek crossings;
- The plant site, including buildings; and
- Access roads or other transport corridors.

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

3.2.4 Land Use

3.2.4.1 Description of Environmental Values

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

- Land tenure (including reserves, tenure of special interest such as protected areas and forest reserves, roads and road reserves, railways and rail reserves, and stock routes);
- Land use (urban, residential, industrial, agricultural, forestry, recreational, mining including mining and petroleum exploration tenures, mining leases, mining claims, mineral development licences, extractive industry permits, petroleum leases and pipeline licences);
- Location of mines and mineral processing plants, gas and oil wells, processing plants and storage facilities;
- Areas covered by applications for native title determination, 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 economic mineralisation, gas and oil fields and extractive resources within the Project area;
- Location of gas and water pipelines, water drainage/water course, power lines, telecommunication cables, roads, railways, bridges, airports, airstrips, helipads and other easements;
- Location of any road-rail intersections/ grade separation crossings and any proposed rail routes adjacent to roads; and
- The distance of facilities from residential and recreational facilities.

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

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

3.2.4.2 Potential Impacts and Mitigation Measures

The potential for the construction and operation of the Project to change existing and potential land uses of the Project site and adjacent areas should be detailed. Post operations land use options should be detailed including suitability of the area to be used for agriculture, industry, or

nature conservation. The factors favouring or limiting the establishment of those options should be given in the context of land use suitability prior to the Project and minimising potential liabilities for long-term management.

This section should include the following:

- Assessment of the compatibility of the Project with surrounding land uses;
- Description of possible impacts on surrounding land uses and human activities as a result of Project activities, including impacts to GQAL and forestry land addressing:
 - loss of access to land;
 - fragmentation of sites;
 - subsidence of site areas;
 - impacts on groundwater;
 - increase of fire risk; and
 - loss of productive land for those purposes.
- Possible impacts on urban development, recreation, tourism and other business uses in the area;
- The strategy and progress in relation to making of Native Title agreements, including NTRBs, consultant selection, traditional owner involvement and related statutory processes;
- 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 components;
- Possible impacts of drilling activities within the vicinity of the area by other groups/individuals (e.g. exploration for natural resources, drilling for water resources, drilling for further CO₂ disposal, drilling for hydrothermal resources etc.);
- Description of the methods to be used to ensure that the UCG chamber (including any zones of influence or contamination) does not extended beyond the mining lease boundaries;
- Potential for other non-Project activities to impact on the area (e.g. quarrying, trenching, excavation for construction, residential, industrial, and transport and road construction); and
- Identification of any millable timber in the area and an assessment of the commercial value of these resources to satisfy the requirements of the DNRW – Forest Products.

Measures to avoid or minimise impacts to current and potential future land uses should be outlined. If the development adjoins or potentially impacts on GQAL, then an assessment of the potential for land use conflict is required. Investigations should follow the procedures set out in the planning guideline, “The Identification of Good Quality Agricultural Land, which supports State Planning Policy 1/92”.

3.2.5 Landscape Character and Visual Amenity

3.2.5.1 Description of Environmental Values

This section should describe in general terms the existing character of the landscape that will be affected by the Project. It should comment on any changes that have already been made to the natural landscape since European settlement. It should describe the general impression of the landscape that would be obtained while travelling through and around it.

This section should also 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 should 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 the Project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area;
- 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 Project 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.

3.2.5.2 Potential Impacts and Mitigation Measures

The potential impacts of the Project landscape character of the site and the surrounding area should be described. Particular mention should be made of any changes to the broad-scale topography and vegetation character of the area, such as due to earthworks and broad-scale clearing. Details should be provided of measures to be undertaken to mitigate or avoid the identified impacts.

This section should also discuss the visual impact of the construction and operation of the Project as it relates to the surrounding landscape on particular panoramas and outlooks. The assessment should address the local and broader visual impacts of the Project structures. Appropriate simulations to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations should be utilised. The significance of any clearing of vegetation, from a local amenity, landscape and visual perspective should be discussed.

Information should be supplied on the techniques proposed to minimise visual impacts. Special consideration should be given to public roads or thoroughfares or places of residence, recreation, worship or work which are within the line-of-sight of the Project sites. Details of the design and colour of any major structures, buildings or fixed plant and all proposed screenings either vegetative or material should be described and discussed where relevant to the minimisation of the visual impacts of the Project. The obstruction of sunlight due to the

construction of buildings or alteration of landforms should be considered, as well as major illumination or reflection impacts on adjacent properties or roads.

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

Details of management of lighting for all stages of the Project should be provided, with particular reference to the objectives and proposed management regime to mitigate or avoid:

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

3.2.6 Land Contamination

3.2.6.1 Description of Environmental Values

This section should discuss the potential for land contamination within the Project area from existing and past uses, based on land use history and the nature and quantity of any contaminants. The review should identify land within the proposed mine, associated infrastructure corridors and any other areas affected by the proposed works, which has been used, or is being used, for a Notifiable Activity as listed in Schedule 2 of the EP Act, or is potentially contaminated, or is on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).

The EIS should include a preliminary site investigation, for all properties that will be affected by the Project.

3.2.6.2 Potential Impacts and Mitigation Measures

A strategy for managing potential contamination on those properties, which are listed on the EMR/CLR, should be developed and submitted to the EPA's Contaminated Land Unit, prior to commencement of the Project.

The EIS should discuss the management of any contaminated land and potential for contamination from construction, commissioning and operation, in accordance with EPA's "Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998)" and the "National Environment Protection (Assessment of Site Contamination) Measure 1999".

The EIS should also describe the possible contamination of land from aspects of the Project, including from the operation of the UCG, CTL and power generation facilities and potential spills at chemical and fuel storage and handling areas.

This section should describe strategies and methods to be used to prevent and manage any land contamination resulting from the Project, including the management of chemicals and fuels

to prevent spills or leaks.

3.3 Nature Conservation

This section of the EIS should describe the environmental values of nature conservation of the Project and how these have changed over time. The environmental values of nature conservation for the affected area should be described 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 Project. The flora and fauna communities which are rare or threatened, environmentally sensitive localities including waterways, riparian zone, 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 produced by the EPA.

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

3.3.1 Sensitive Environmental Areas

3.3.1.1 Description of Environmental Values

The EIS should identify whether areas that are environmentally sensitive could be affected, directly or indirectly by the Project. Environmentally sensitive areas should also include areas classified as having state, regional or local biodiversity significance or flagged as important for their integrated biodiversity values in accordance with the “Biodiversity Assessment and Mapping Methodology (EPA 2002)”.

In particular, the EIS should indicate if the land affected by the Project is, or is likely, to become part of the protected area estate, or is subject to any treaty. Consideration should also be given to other national parks, conservation parks, wilderness areas, heritage/historic areas or items, national estates, areas of cultural significance and scientific reserves within the vicinity of the Project.

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 NCA and/or EPBC Act as presumed extinct, endangered, vulnerable or rare;
- Regional ecosystems listed as 'endangered' or 'of concern' under state legislation, and/or ecosystems listed as presumed extinct, endangered or vulnerable under the EPBC Act;
- Good representative examples of remnant regional ecosystems or regional ecosystems which are poorly represented in protected areas;
- Sites containing near threatened or bio-regionally significant species or essential, viable habitat for near threatened or bio-regionally significant species;
- Sites in, or adjacent to, areas containing important resting, feeding or breeding sites for migratory species of conservation concern listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (JAMBA) and between Australia and China (CAMBA);
- Sites containing common species which represent a distributional limit and are of scientific value or which contain 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 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 NCA or are under consideration for proclamation; and
- Areas of major interest, or critical habitat declared under the NCA or high nature conservation value areas or areas vulnerable to land degradation under the VMA.

In addition, the EPBC Act should be addressed with regard to MNES identified by the Australian Government when the Project was determined to be a 'controlled action'. Targeted surveys need to be completed for all EPBC Act listed species likely to occur in the Project area. The EIS should include a discussions on the following listed threatened species and ecological communities under the EPBC Act, and any other listed species or communities found during survey work that could be affected within the Project area:

- *Acacia harpophylla* (Brigalow woodland);
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland;
- *Dichanthium sericeum* (Queensland bluegrass);
- *Homopholis belsonii*;

- *Digitaria porrecta* (Finger panic grass);
- *Geophaps scripta* (Squatter pigeon); and
- *Paradelma orientalis* (Brigalow scaly-foot).

The EIS should identify issues relevant to sensitive areas, which may have low resilience to environmental change. Areas of special sensitivity include 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 or emissions should be assessed. The proximity of any Project infrastructure to any biologically sensitive areas should be described.

Reference should be made to both Queensland and Australian endangered species legislation and the proximity of the area to any World Heritage property. The VMA and the findings of any Regional Vegetation Management Plan should also be referenced.

3.3.1.2 Potential Impacts and Mitigation Measures

This section should discuss the following:

- Potential direct and indirect impacts of the Project on species, communities and habitats of local, regional or national significance as identified above, including sensitive areas and EPBC Act listed threatened species and communities;
- Proposals to mitigate such impacts (e.g. timing of works, minimise area of disturbance, proposed rehabilitation of disturbed sensitive areas and off-sets);
- Planned rehabilitation of sensitive communities and any relevant previous experience or experiments rehabilitating these communities;
- Proposals to support environmental values within the Project area.

3.3.2 Terrestrial Flora

3.3.2.1 Description of Environmental Values

A map of terrestrial vegetation (including remnant vegetation, re-growth, restored areas and non-remnant vegetation on State land) at a suitable scale should be provided, with reference to the current certified regional ecosystem mapping and descriptions of the units mapped. Sensitive or important vegetation types should be highlighted, including any riparian vegetation, and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types. The existence of rare or threatened species should be specifically addressed. The surveys should include species structure, assemblage, diversity and abundance. The description should contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests.

In particular, the EIS should contain results from surveys for threatened species and communities conducted during and following the flower set and seeding period. Vegetation

mapping should provide vegetation mapping for all relevant Project sites, including any off-site infrastructure development, if relevant. Adjacent areas may also require mapping.

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

- Location, extent, biodiversity status and conservation status of vegetation types using the EPA's regional ecosystem type descriptions in accordance with "Queensland Herbarium (2003), Regional Ecosystem Description Database, Version 4.2, March 2005" and "The Conservation Status of Queensland's Bioregional Ecosystems, Sattler P.S. & Williams R.D. (Eds) 1999";
- 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 VMA;
- The current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (national parks, conservation parks, resource reserves, nature refuges); and
- Any plant communities of cultural, commercial or recreational significance.

Within each defined (standard system) vegetation community, a minimum of three sites 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;
- Appropriate minimum site sizes should be selected, observing recognised sampling approaches and to provide an adequate sample of surveyed communities;
- 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;
- Vegetation mapping and data should be submitted to the Queensland Herbarium to assist the updating of the CORVEG database; 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.

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 interest. The assessment should also include the significance of native vegetation, from a local, regional, state and national perspective.

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 EIS. Any existing information should be revised and comments provided on whether the areas are degraded, cleared or affected in ways that would affect their environmental value.

A description of the habitat requirements and the sensitivity of aquatic flora species to changes in flow regime, water levels and water quality in the Project areas should be described.

The occurrence of pest plants (weeds), particularly declared plants under the *Land Protection (Pest and Stock Route Management) Act 2002* should be shown on a map at an appropriate scale. Any survey to identify the presence of such plants will need to occur after significant summer rainfall events to allow germination.

The location of any horticultural crops in the vicinity of the Project facilities should be shown.

3.3.2.2 Potential Impacts and Mitigation Measures

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

Indirect effects on remaining vegetation should be discussed against performance requirements within the “Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregion - 20 November 2006”.

The potential environmental harm on flora of any alterations to the local surface and ground water environment should be discussed with specific reference to potential environmental harm on vegetation with conservation value. 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.

Where removal of native vegetation is proposed, alternative management strategies such as compensatory plantings and conservation projects within and outside the Project area, rehabilitation trials using significant flora species or protection of nearby significant vegetation should be described. Any specific ‘off set’ vegetation protection proposals to compensate for the removal of endangered vegetation (State and Commonwealth) should be outlined. Consideration should be given to proposals to link revegetated areas with undisturbed regional ecosystems. Mitigation measures and/or offsets should be proposed for adverse impacts in accordance with the “Policy for Vegetation Management Offsets (DNRW, 2007)”.

The EIS should discuss weed management strategies to contain existing weed species (e.g. declared plants) and ensure no new declared plants are introduced to the area. Consideration should be given to a “come clean, go clean” weed control policy and to weed wash-down

certification.

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

3.3.3 Terrestrial Fauna

3.3.3.1 Description of Environmental Values

The terrestrial and riparian fauna occurring in the areas affected by the Project 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 birds, reptiles, mammals and bats;
- Any species that are poorly known but suspected of being rare or threatened;
- Habitat requirements and sensitivity to changes, including movement corridors and barriers to movement;
- The existence of feral or exotic animals;
- Existence of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans); and
- Use of the area by migratory birds, nomadic birds, fish and terrestrial fauna.

The EIS should indicate how well any affected communities are represented and protected elsewhere in the sub-region where Project sites occur. Site data should be recorded in a format compatible with EPA Wildnet databases.

3.3.3.2 Potential Impacts and Mitigation Measures

The EIS should describe the potential impacts on fauna due to the disruption of their movement corridors by the removal of sections of habitat and by the fragmentation of habitat due to the Project activities. Mitigation measures for impacts on fauna movement should be proposed and discussed. These impacts should be assessed in the context of how well the ecological values are represented and protected elsewhere, as identified by the “Biodiversity Assessment and Mapping Methodology (EPA 2002)”.

The provision of buffer zones and movement corridors, and strategies to minimise environmental harm on migratory, nomadic and aquatic animals should be discussed. This should consider measures to minimise wildlife capture and mortality; and provide details of the methodology that would be used to assess and handle injuries that may be inflicted on livestock or native fauna as a result of construction or operational works for the Project.

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 feral animal species. Reference should be made to the local government authority's pest management plan when determining control strategies. The strategies for management of pest fauna should be discussed and provided in a working form in a Pest Management Plan as part of the overall EMP for the Project.

3.3.4 Aquatic Biology

3.3.4.1 Description of Environmental Values

The aquatic flora and fauna occurring in the areas potentially affected by the Project should be described, noting the patterns and distribution in the waterways. A description of the habitat requirements and the sensitivity of aquatic flora and fauna species to changes in flow regime, water levels and water quality in the Project areas should be described.

The description of the fauna and flora present or likely to be present at any time during the year in the Project area should include:

- Fish species, mammals, reptiles, amphibians and aquatic invertebrates (including stygafauna) occurring in waterways;
- Aquatic (waterway) plants, including any declared pest plants;
- Aquatic communities at the site in relation to the different functioning stream and wetland ecologies;
- Information on: fish species likely to move through the area; habitat that the fish may move to; and details of any barriers that may be built and which may restrict such movement; and
- Aquatic substrate and stream type.

3.3.4.2 Potential Impacts and Mitigation Measures

This section should discuss all foreseen direct and indirect effects on aquatic flora and fauna. Strategies for protecting rare or threatened species should be described, and any obligations imposed by Queensland or Australian Government endangered species legislation or policy should be discussed.

Impacts during construction and operation of the Project should be assessed. Information should be provided on all stream crossings (temporary and permanent) and any proposed stream works associated with the Project and how these will be designed, constructed and managed to ensure that fish passage is not compromised. Short term and long term durations should be considered. Measures to mitigate the impact on habitat or the inhibition of normal movement, propagation or feeding patterns, and change to food chains should be described. Any provision for buffer zones and movement corridors, or special provisions for migratory, nomadic and aquatic animals should be discussed. Details of mitigation strategies should be provided, including information on the design of any bed and bank diversions to provide equivalent or improved aquatic and riparian habitat to the existing waterways.

With regard to aquatic flora and fauna, the assessment of potential impacts should consider:

- The effects of changes to any surface water flow regime and potential impact of groundwater drawdown;
- Effects on key rare and threatened or otherwise noteworthy plant and animal species, including listed threatened and listed migratory species and their habitat;
- All permits/authorities required by the Project associated with activities in waterways (e.g. permits under the *Fisheries Act 1994* to construct temporary or permanent waterway barriers);
- The potential for, and mitigation measures to prevent, the creation of new mosquito and biting midge breeding sites during construction and operation; and
- The potential for, and mitigation measures to prevent, the introduction, transfer or facilitation of exotic, non-indigenous and noxious plants and water borne insect pests.

3.4 Water Resources

This section should describe the existing environment for water 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” [EPP (Water)], “Australian and New Zealand Environment Conservation Council 2000” and the “South East Queensland Water Quality Management Strategy”. The definition of waters in the EPP (Water) includes the bed and banks of waters, so this section should address impacts on benthic sediments as well as the water column.

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

3.4.1 Surface Waterways

3.4.1.1 Description of Environmental Values

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

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

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

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

The environmental values of the surface waterways of the affected area should be described in terms of:

- Values identified in the EPP (Water);
- Sustainability, including both quality and quantity;
- Physical integrity, fluvial processes and morphology of watercourses, including riparian zone vegetation and form;
- Any water resource plans, land and water management plans relevant to the affected catchment; and
- Existing and other potential surface water users.

3.4.1.2 Potential Impacts and Mitigation Measures

The water management systems for all Project elements should be described, addressing surface water quality, quantity, drainage patterns and sediment movements. The beneficial (environmental, production and recreational) use of nearby surface water should be discussed, along with any proposals for the diversion of affected creeks during construction or operation of the Project, and the stabilisation of those works.

Monitoring programs should be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the Project. Monitoring programs should also be designed to evaluate changes in the physical integrity and geomorphic processes associated with stream diversions.

Key water management strategy objectives include:

- Maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota);
- Maintenance or replication of the existing geomorphic condition of local watercourses; and
- Minimisation of impacts on flooding levels and frequencies both upstream and downstream of the Project.

Potential impacts to the flow and the quality of surface waters from all phases of Project activities should be discussed, with particular reference to implications for current and potential

downstream uses, including the requirements of any affected riparian area and in-stream biological uses in accordance with the EPP (Water) and the *Water Act 2000*. The impacts of surface water flow on any existing water infrastructure should also be considered.

The EIS should describe the proposed Project stormwater drainage system and disposal arrangements. This should include information on:

- The chemical and physical properties of any waste water, including stormwater at the point of discharge into natural surface waters, including the toxicity of effluent to flora and fauna;
- Design criteria, diversions, volume and capacity of any retention ponds, process tanks or bunded areas, as well as those reasonable and practicable measures proposed to prevent the likely release of contaminated stormwater to any drain or waters;
- The collection, treatment and disposal of contaminated stormwater runoff from the GTL plant, power generation plant and associated materials handling facilities;
- Potential impacts on other downstream creeks, if it is proposed to discharge water to the creek system or during extreme rainfall events; and
- Risk assessment for uncontrolled releases to water due to system or catastrophic failure, implications of such emissions for human health and natural ecosystems, and strategies to prevent, minimise and contain impacts.

The environmental values of the surface waters potentially affected by the Project should be identified in accordance with the EPP (Water). Surface water quality objectives should be determined after consideration of the “Australian and New Zealand Guidelines for Fresh and Marine Water Quality (NWQMS 4, 2000)” and the “Queensland Water Quality Guidelines (2006)”.

Where dams, weirs, voids or ponds are proposed, the EIS should investigate the effects of predictable climatic extremes (droughts, floods) upon the structural integrity of the containing walls, and the quality of water contained, and flows and quality of water discharged.

A dam failure impact assessment should be carried out for any proposed dams that, due to their size, trigger the need for such an assessment under the *Water Act 2000*. Any dams that are likely to be referable under the *Water Act 2000* should be noted and emergency response procedures incorporated into the Project's Environmental Management Plan (EMP).

The need, or otherwise, for licensing of any dams (including referable dams) or creek diversions, under the *Water Act 2000*, should be discussed. The process for water allocation and water discharge should be established in consultation with the EPA and DNRW. Consideration should also be given to any water allocation and management plans.

Consideration should be given to the potential impacts of the Project on floodplain hydrology (including changes to flooding characteristics), existing land use and infrastructure and the integrity of any watercourses. Minimising risk to life and property and the protection of water (flood harvesting) entitlements are also issues that should be addressed. Potential impacts to

the natural environment from stream diversions should also be discussed.

Risks to farmland from potentially contaminated surface water flow, particularly during flood events and/or failure of levee banks, should be assessed.

Options for flood mitigation and the effectiveness of mitigation measures should be discussed with particular reference to sediment, salinity and other emissions of a hazardous or toxic nature to human health, flora or fauna. Consideration should also be given to any increased risk to surrounding properties from flooding, with details of the location of structures that may divert or concentrate flood flows.

3.4.2 Groundwater

3.4.2.1 Description of Environmental Values

The EIS should review the quality, quantity and significance groundwater resources within the Project area. The review should include a survey of existing groundwater supply facilities (bores, wells, or excavations). The information to be gathered for analysis should include:

- Location and type of facilities;
- Pumping parameters;
- Draw down and recharge at normal pumping rates;
- Seasonal variations (if records exist) of groundwater levels;

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

This section should include reference to the:

- Nature of the aquifer/s:
 - geology, stratigraphy and structures;
 - aquifer type - such as confined, unconfined;
 - depth to and thickness of the aquifer and transmissivity of the aquifer; and
 - potential for aquifer interconnectivity;
- Hydrology of the aquifer/s:
 - depth to water level and seasonal changes in levels, including response to existing extraction;
 - groundwater flow directions (defined from water level contours);
 - interaction with surface water;
 - existing and possible sources of recharge; and
 - vulnerability to pollution.

The data obtained from the groundwater survey should be sufficient to enable specification of the major ionic species present in the groundwater, pH, electrical conductivity, total dissolved solids and relevant hydrocarbons (such as total petroleum hydrocarbons, benzene, toluene,

ethylbenzene, xylenes and polycyclic aromatic hydrocarbons).

The environmental values of the underground waters of the affected area should be described in terms of:

- Values identified in the EPP (Water);
- Sustainability, including both quality and quantity; and
- Physical integrity, fluvial processes and morphology of groundwater resources.

3.4.2.2 Potential Impacts and Mitigation Measures

The EIS should include an assessment of the potential environmental harm caused by the Project to local groundwater resources, with reference to the data acquired during the UCG demonstration on MDL 309.

The impact assessment should define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and the significance of the Project to groundwater depletion or recharge. The EIS should assess the potential for the operation of the project to impact on the integrity of the water table (both within and external to the project area) and the potential impact to petroleum development activities within the local area.

This section should also propose management options available to monitor and mitigate these effects in particular, proposed methods and the feasibility of those methods to 'make good' any adverse affects on the groundwater resources utilised by adjacent landholders. The expected response of the groundwater resource to the progression and finally cessation of the Project should be described, particularly in relation to the recharge potential of aquifers affected by mining.

The EIS should include mapping and a description of potential impacts for those areas where groundwater drawdown could deplete water in the root zone of vegetation with conservation value, particularly in localities with endangered regional ecosystems or threatened species. The sensitivity of the modelling should be of sufficient precision to fully assess the extent of groundwater depletion in the root zone of vegetation with conservation value.

An assessment should be undertaken of the impact of the Project on the local ground water regime caused by the UCG process and any associated land subsidence, with reference to data acquired from the Chinchilla UCG demonstration, including monitoring methods and results. An assessment of the potential to contaminate groundwater resources and associated potential impacts to humans and livestock and measures to prevent, mitigate and remediate such contamination should be discussed.

The EIS should include details of the proposed groundwater monitoring program to detect increases in likely species of hydrocarbons (such as total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes and polycyclic aromatic hydrocarbons) during start-up, full capacity operation, shutdown and decommissioning.

3.5 Air Environment

3.5.1 Description of Environmental Values

This section should describe the existing air environment that may be affected by the Project having particular regard for particulates and gaseous and odorous compounds. The background levels and sources of suspended particulates, sulphur oxides (SO_x), nitrogen oxides (NO_x), and any other major constituents of the existing air environment that may be affected by the Project should be discussed.

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

The environmental values of the air shed for the affected areas should be described in terms of the “Environmental Protection (Air) Policy, 1998” [EPP(Air)], the “National Environmental Protection Measures for Ambient Air Quality”, the “National Environmental Protection Measures for Air Toxics”, and the World Health Organization’s “Air Quality Guidelines Global Update, 2005”.

3.5.2 Potential Impacts & Mitigation Measures

The EIS should state the objectives for air emissions in respect of relevant standards (ambient and ground level concentrations), relevant emission guidelines and any relevant legislation. Air emissions from all aspects of the Project should be modelled using a recognised atmospheric dispersion model. The EIS should examine the effects of adverse meteorological conditions (e.g. inversions) and mixing heights on air quality. The potential for interaction between the emissions from the GTL and power generation components and other emissions in the air shed, and the likely environmental harm from any such interaction, should also be detailed.

The effects of emissions on air quality should be examined, and where appropriate, the predicted average ground level concentrations in nearby areas should be provided. These predictions should be made for both normal and expected maximum emission conditions, the worst case meteorological conditions and upset conditions such as power failure, start up and typical plant failures should be identified and modelled where necessary. Ground level predictions should be made at any residential, industrial and agricultural developments believed to be sensitive to the effects of predicted emissions. The techniques used to obtain the predictions should be referenced, and key assumptions and data sets explained.

The assessment of the Project’s impact on air quality should consider the following matters:

- The potential for the Project to generate a dust nuisance during and after construction;
- The extent to which NO_x and volatile hydrocarbon emissions from the Project and existing emission sources within the region could contribute to the generation of

photochemical smog;

- The extent to which SO_x emissions from the Project and existing emission sources within the region could contribute to the generation of acid rain or acidification of other atmospheric condensation, such as dew;
- The human health risk associated with emissions from the Project, of all hazardous or toxic pollutants for both normal operation and contingency events;
- The potential for odour nuisance and other impacts;
- Features of the Project designed to suppress or minimise air emissions, including dust (PM10 fraction of particulates) and odours;
- Air quality aspects for forecast emissions derived from other similar projects;
- Air shed management and the contribution of the Project to air shed capacity in view of existing and future users of the air shed for assimilation and dispersion of emissions and
- Air quality monitoring program within the Project areas and at sensitive receptors.

Where there is no single atmospheric dispersion model that is able to handle the different atmospheric dispersion characteristics exhibited in the Project areas (e.g. strong convection, terrain features, temperature inversions and pollutant re-circulation), a combination of acceptable models will need to be applied. The limitations and accuracy of the dispersion models used for calculating ground level concentrations and a sensitivity analysis of each model to variations in the input parameters should be discussed.

Air quality predictions should be compared to the relevant goals and standards contained in the EPP (Air), “National Environmental Protection Measures for Ambient Air Quality”, the “National Environmental Protection Measures for Air Toxics” and the National Health and Medical Research Council goals.

3.5.3 Greenhouse Gas Emissions

A full assessment of greenhouse gas emissions from the Project should be provided including:

- An inventory of proposed future annual emissions for each Greenhouse Gas and total emissions expressed in ‘CO₂ equivalent’ terms for each component of the Project and for the combined total Project;
- The intended measures to avoid and minimise greenhouse emissions; and
- Participation in Australian Government reporting and abatement schemes.

The above assessment should be undertaken with due consideration of relevant protocols, agreements and strategies including: “The National Greenhouse Strategy”; “National Greenhouse Gas Inventory”; “The Framework Convention on Climate Change”; and voluntary programs under the Australian Greenhouse Office.

The Project should include estimates of any coal seam methane released, as well as emissions resulting from such activities as operation of the GTL and power generation plants, transportation of products and consumables, and any other energy use by the Project.

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

should include:

- A description of the proposed measures (alternatives and preferred) to avoid and/or minimise greenhouse gas emissions directly resulting from activities of the Project, including such activities as transportation of products and consumables, and energy use by the Project;
- An assessment of how the preferred measures minimise emissions and achieve energy efficiency;
- An indication of how the preferred measures for emission controls and energy consumption compare with practice in the relevant sector of industry with a view to achieving best practice environmental management; and
- Opportunities for offsetting greenhouse gas emissions (e.g. forestry plantations, investing in renewable energy projects, purchase of renewable energy or support for relevant research, etc.).

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

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

3.6 Noise & Vibration

3.6.1 Description of Environmental Values

The EIS should describe the existing environmental values that may be affected by noise and vibration from Project activities.

If Project activities could adversely impact on the noise environment, baseline monitoring should be undertaken at a selection of noise sensitive sites affected by the Project. Noise sensitive places in relation to the Project should be identified on a map at a suitable scale. Long-term measured background noise levels should take into account seasonal and meteorological variations. The results of any baseline monitoring of noise and vibration in the proposed vicinity

of the Project should be described.

Sufficient data should be gathered to provide a baseline for later studies. The daily variation of background noise levels at nearby sensitive sites should be monitored and reported in the EIS, with particular regard given to detailing variations at different periods of the day and night. Monitoring methods should adhere to relevant EPA Guidelines and Australian Standards, and any relevant requirements of the “Environmental Protection (Noise) Policy, 1997” [EPP (Noise)]. Comment should be provided on any current activities near the Project areas that may cause a background level of noise and ground vibration (e.g. other industry, railway, major roads, etc.).

3.6.2 Potential Impacts & Mitigation Measures

Information, including mapped noise contours from a suitable acoustic model for the coal gasification and power generation components, major compressor units and injection wells, should be submitted on the proposed generation of noise.

This section should include an analysis of the following noise and vibration impacts:

- Anticipated noise levels generated during construction (including any blasting), operation and transport movements of all components of the Project and their timing and duration;
- Assessment of noise levels against current typical background levels, in conjunction with the sensitivity of receptors;
- An estimate of the cumulative noise level at the boundaries of the Project and at the boundaries of existing and future land uses likely to be affected by noise from the Project;
- Assessment of potential low-frequency noise emission (noise with significant components below 200Hz) from major items of equipment and plant and measures for reducing the intensity of these components, with reference to the EPA’s draft guideline, “Assessment of Low Frequency Noise”;
- Potential environmental harm 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 taking into consideration the EPA guideline “Planning for Noise Control”;
- Potential environmental harm from noise and vibration to terrestrial animals and avifauna, particularly migratory species;
- Proposals to minimise or eliminate these effects, including details of any screening, lining, enclosing or bunding of facilities, or timing schedules for construction and operations that would minimise environmental harm and environmental nuisance from noise; and
- Off-site noise and vibration factors due to increased road or other transportation, including a discussion on existing speed zones and scheduled transport movements.

3.7 Waste

3.7.1 Waste Generation

This section should provide technical details of waste generation, treatment, minimisation and

management, with proposed emission, discharge and disposal criteria. Waste should be defined and considered in accordance with the EP Act, and the “Environmental Protection (Waste Management) Policy, 2000” [EPP (Waste)] and include gas, liquid or solid, or a combination of any of them.

The EIS should identify and describe all sources of waste associated with construction, commissioning, operation and decommissioning of all components of the Project. This section should describe all activities including:

- The amount and characteristics of solid and liquid waste produced;
- Hazardous materials to be stored and/or used on-site, including provision of their Material Safety Data Sheets and environmental toxicity data and biodegradability;
- Any waste treatment process involved, including site drainage and erosion controls;
- Selection criteria for, and location of, likely run-off/stormwater discharge points;
- Descriptions should also include (using maps and plans as appropriate):
 - generation points;
 - storage methods and facilities; and
 - quantities.

3.7.2 Waste Management

The EIS should provide details of waste management methods which demonstrate that waste minimisation and cleaner production techniques and designs have been implemented through the selection of processes, equipment and facilities to prevent or minimise environmental impacts. This information should include:

- A brief description of the existing environmental values that may be affected by the Project’s waste, the impacts on those values and mitigation measures;
- A waste management plan developed in accordance with the waste management hierarchy and principles of the EPP (Waste);
- Collection, handling and fate of all wastes, including storage of wastes;
- On-site treatment methods proposed for the wastes;
- Management of wastes produced under circumstances other than as a result of normal Project development, including wastes generated during modification (e.g. run-off, chemical cleaning before commissioning), unusual conditions when the facilities are operating (e.g. start-up, maintenance, shut-down) and domestic sewage and refuse;
- Cleaner production waste management planning, including how these concepts have been applied to prevent or minimise environmental impacts at each stage of the Project;
- Methods to prevent seepage and contamination of groundwater from waste stockpiles;
- Market demand for recyclable waste (where appropriate);
- Opportunities for waste avoidance and minimisation techniques;
- 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; and
- Proposed disposal criteria for liquid and solid wastes.

Where solid or liquid wastes are to be disposed of off-site the following details should be provided:

- The name and location of the facility to which each waste will be sent for disposal;
- Confirmation from each facility that it will accept the type, concentration and quantity of the nominated wastes;
- An assessment that the proposed facilities are capable of accepting this waste without creating an adverse environmental impact; and
- Details that the transport of the wastes from the Project site to the disposal facility will comply with all requirements of the relevant acts governing the transport of hazardous wastes.

The EIS should also discuss methods to avoid stormwater contamination by raw materials, wastes or products and present the means of containing, recycling, reusing, treating and disposing of stormwater, having regard for the requirements of the EPP (Water). Where no-release water systems are to be used, measures to minimise any accidental release or the likelihood of such a release should be described and the fate of salts and particulates in released water should be discussed. Further details on the management of stormwater are provided in Section 3.4.1.2.

3.8 Transport

3.8.1 *Transport Methods and Routes*

The EIS should detail all requirements for the transport of plant, equipment, raw materials, products, wastes and personnel during the construction, operation and decommissioning phases of the Project.

The description should address the use of existing facilities and all requirements for the construction, upgrading or relocation of any transport related infrastructure. This information should cover all transportation modes (i.e. road, rail and shipping) required for all aspects of the Project and include:

- Existing traffic volumes on the proposed transport routes;
- The types, quantities, origin and destination of goods to be moved, including construction materials, plant, raw materials, wastes and hazardous materials;
- The volume of traffic generated by workforce personnel and service vehicles;
- Number of trips generated (both light and heavy vehicles);
- Methods of movement, including transportation type and volume of transport modes likely to be used;
- The proposed transport routes;
- Timing and duration of transport activities;
- The need and extent of port facilities required for the Project, including specific shipping requirements such as expected berth duration, the wharf facilities and any issues associated with ship movements within the port;

- Any proposed road closures (temporary or permanent);
- The ability of existing transport infrastructure to support the additional demand;
- Details of over-dimension, excess mass loads or any hazardous goods;
- The effect of any freight demands on rail infrastructure; and
- Any requirements for new transport facilities, upgrades (e.g. new access requirements) and increased maintenance.

This section should describe existing infrastructure facilities within and adjacent to the Project area. The location and owner/custodians of all tenures, reserves, roads and road reserves, railways and rail reserves, stock routes easements and the like, covering the affected land should be shown. The locations and descriptions of all existing roads and railways likely to be affected by Project activities should be provided.

The EIS should broadly describe the overall current state of key roads to be used by Project traffic as a baseline against which potential road impacts might be measured. The description should include pavement type, width, condition, speed environment and road safety profile.

This section should also discuss how transport elements of the Project relate to Queensland Transport's existing transport strategies for the region and the future infrastructure needs of this area as presented in local and state government documentation.

3.8.2 Potential Impacts & Mitigation Measures

Assessment of the Project impacts on transport infrastructure and operations for all components of the Project should be discussed, with reference to the *Transport Infrastructure Act 1994*, the *Transport Planning and Coordination Act 1994*, the *Transport Operations (Road Use Management) Act 1995* and related legislation. Road impacts should be assessed according to the Department of Main Roads (DMR) "Guidelines for Assessment of Road Impacts of Development (April 2006)". Reference should be made to other DMR documents, such as "Road Planning and Design Manual" and the current "Road Implementation Program of Queensland".

The EIS should outline procedures for assessing and agreeing on the scope of required mitigation works with the transport corridor manager. The EIS should provide sufficient details to allow the DMR and Queensland Transport to ascertain compliance with legislative and design requirements to ensure the safe and efficient operation of state-controlled roads, ports and railways are not compromised and the integrity of preserved transport corridors is protected. This section should also provide sufficient information for an assessment of how the state-controlled and local government road networks would be affected by the Project.

The EIS should fully assess all transport-related impacts of the Project including sea, rail, road and air, such as:

- During the construction phase, especially in or near existing and any planned public road or rail reserves;
- Management of transport safety issues, (e.g. ensuring safe access to construction sites

and safety for other transport users), including appropriate incident management strategies;

- Road use resulting in reduced life of road pavements requiring additional or accelerated rehabilitation and maintenance, including an estimate of cost for corrective measures.
- Seasonal considerations such as potential for transport impacts during wet weather;
- Reduced efficiency of traffic flows along road sections and at intersections along key routes, including details on maximum traffic delays;
- Environmental issues relating to transport (e.g. potential for weed spread, protecting vegetation in road/rail reserves, concerns about dust and erosion); and
- The effects of increased resource usage such as gravel and water on long-term maintenance by the road corridor manager.

The EIS should provide details about mitigating transport-related impacts, including:

- Procedures for assessing and agreeing on the scope of required mitigation works with road/rail corridor managers, including any associated works such as sourcing water and gravel;
- Strategies to minimise the effects of Project transport on existing and future public road or rail corridors;
- The effect of any freight demands on rail infrastructure;
- The ability of existing transport infrastructure to support the additional demand;
- Requirements for access to road/rail corridors during construction or operation, including emergency access;
- Methods to be adopted to ensure safety and avoid obstruction to other road/rail users during construction;
- Requirements for the construction, upgrading or relocation of any transport-related infrastructure, such as the need for increased road maintenance;
- Additional or accelerated rehabilitation and maintenance, including an estimate of cost for corrective measures;
- Transportation methods, including mode selection, to take into consideration the full cost to communities;
- Proposed traffic management arrangements and plans, especially within rural residential areas;
- Proposals to prevent unauthorised vehicular access from public roads to the Project site; and
- Environmental issues relating to transport (e.g. weed management, minimising vegetation clearing in road reserves, dust control and erosion protection) and ways to ameliorate any adverse impacts.

Summary conclusions from information gained in the Road Impact Assessment should be incorporated into a Road-use Management Plan as part of the Environment Management Plan (EMP) in Section 4.

3.9 Cultural Heritage

3.9.1 Description of Environmental Values

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

A cultural heritage study should be undertaken to describe indigenous and non-indigenous cultural heritage sites and places and their values. The indigenous component of the study must be conducted by the appropriate Aboriginal Party and/or an appropriately qualified cultural heritage practitioner, in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act). Approval for the study of non-indigenous cultural heritage from the EPA is a requirement under the *Queensland Heritage Act 1992*

The study should include:

- Consultation with:
 - DEW concerning Australian Heritage Places Inventory;
 - EPA regarding the Queensland Heritage Register and other information regarding places of potential non-Indigenous cultural heritage significance;
 - DNRW regarding the Indigenous Site Database;
 - any local government heritage register; and
 - any existing literature relating to the affected areas;
- Liaison with representatives of relevant Aboriginal communities, in accordance with the requirements of the ACH Act, 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 or site data; 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;
- Location of culturally significant sites, subject to any confidentiality specified by Indigenous communities, likely to be impacted by construction activities including:
 - stone artefact scatters;
 - culturally significant vegetation;
 - buildings or places of archaeological significance; and
 - archaeological site, natural sites, story sites etc.;
- Presentation of findings of consultation with various agencies, communities, organisations and other relevant parties; and
- When examining tenure, the location of historical mining areas should be shown on maps. This may be used to identify former mining zones or historical workings.

The EIS should include a report of the work done, to cover 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 as to satisfy statutory responsibilities and duties of care, including those under the Queensland *Heritage Act 1992* and the ACH Act, and the Australian *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* and cultural heritage requirements of the EPBC Act to protect areas and objects of cultural heritage significance.

3.9.2 Potential Impacts & Mitigation Measures

Every attempt should be made by the Project to avoid any significant heritage areas. The EIS should provide an assessment of any likely effects on sites of indigenous and non-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 values likely to be affected by the Project and their values at a local, regional and national level; and
- Recommended means of mitigating any negative impact on cultural heritage values and enhancing any positive impacts.

The management of indigenous cultural heritage impacts should be detailed in either a Native Title Agreement (NTA), under the *Native Title Act 1993*, or a Cultural Heritage Management Plan (CHMP) under the ACH Act that is developed specifically for the Project. The NTA or CHMP should provide a process for the management of identified cultural heritage places and values within the Project area.

The EIS should describe how the potential impacts to Aboriginal cultural heritage cultural heritage values in the vicinity of the Project will be managed. The EIS should explain how the CHMP or NTA satisfy the statutory responsibilities and duties of care to protect areas and objects of cultural heritage significance under the ACH Act, *Queensland Heritage Act 1992*, the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) and the cultural heritage requirements of the EPBC Act.

The consent of the Traditional Owners should be sought to allow an outline of the intention of the CHMP. However, it is envisaged that specific details about the agreements and accompanying CHMP will remain confidential.

The CHMP should be based on information contained in the cultural heritage study report and/or information from the indigenous community/communities. The CHMP should include the following:

- A process for including Aboriginal people associated with the development areas in protection and management of indigenous cultural heritage;

- Processes for mitigation, management and protection of identified cultural heritage places and material in the project areas, including associated infrastructure developments, both during the construction and operational phases of the Project;
- Provisions for the management of the accidental discovery of cultural material, including burials;
- The monitoring of foundation excavations and other associated earthwork activities for possible sub-surface cultural material;
- Cultural awareness training or programs for Project staff; and
- A conflict resolution process.

The EIS should describe the significance non-indigenous cultural heritage values identified within the Project area and outline the Proponent's proposed management strategy for significant non-indigenous cultural heritage values that may be impacted by the Project.

3.10 Social Environment

3.10.1 Description of Environmental Values

This section should describe the existing social values that might be affected by the Project in terms of the integrity of social conditions, including amenity and liveability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure. The social amenity and use of the Project and adjacent areas for rural, agricultural, forestry, fishing, recreational, industrial, educational or residential purposes should be described.

Consideration should be given to:

- Population and demographics of the affected community, including size, age structure, gender composition, residency) including employment and unemployment rates;
- Local community values, vitality and lifestyles;
- Workforce characteristics, including types of skills or occupations and availability both for construction and operation phases of the Project;
- Community infrastructure and services, access and mobility;
- Health, emergency services and educational facilities;
- Recreational, cultural, leisure and sporting facilities and activities;
- Rural properties, farms, croplands and grazing areas;
- On-farm activities near the proposed activities;
- Current property values;
- Number of properties directly affected by the Project; and
- Number of families directly affected by the Project, this should include not only property owners but also families of workers either living on the property or workers where the property is their primary employment.

Information should also be provided on the existing housing market in the area, with an emphasis on:

- The size of the private rental market;
- The vacancy rate of rental accommodation, including assessment of seasonal fluctuations;
- Typical rents;
- The availability and typical cost of housing for purchase;
- The level of, and demand for, social housing;
- Constraints and opportunities for new housing construction, including the capacity of the local land development and housing construction industries to provide new housing; and
- Land for residential purposes including available serviced residential lots, land under development and undeveloped broad acre land that are appropriately zoned.

3.10.2 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. The impacts of the Project on local and regional residents, community services and recreational activities should be analysed and discussed for all stages of the development. The nature and extent of the community consultation program should be described and a summary of the results incorporated in the EIS.

The social impact assessment should include sufficient data to enable state authorities, such as Queensland Health and Education Queensland, to plan for the continuing provision of public services in the region of the Project. The summary should discuss how the impacts of population increase on public services, particularly health and education, would be mitigated.

The social impact assessment of the Project should be carried out in consultation with the Department of Communities and other relevant agencies. The assessment of impacts should describe the likely response of affected communities and identify possible beneficial and adverse impacts (both immediate and cumulative). These impacts should be considered both at the regional and local level in the short term and longer term (including Project closure).

The EIS should address the following matters:

- Impacts on demographic, social, cultural and economic profiles;
- Impacts on local residents, current land uses and existing lifestyles and enterprises.
- Impacts on affected and adjoining landowners/occupiers resulting from the Project (e.g. land values);
- Impacts on human service delivery, including counselling and support services;
- Impacts on local and state labour markets, with regard to the source of the workforce. This information should be presented according to occupational groupings of the workforce, along with opportunities for local employment;
- Any new skills and training to be introduced in relation to the Project, including the occupational skill groups required and potential skill shortages anticipated;
- Extent that service revenue and work from the Project (e.g. provisioning, catering and site maintenance) would be likely to flow to existing communities in the area; and

- Impacts on existing local residents' values and aspirations.

In regard to affected indigenous and non-indigenous communities respectively, particular attention should be paid to the effects on:

- The ability of both indigenous and non-indigenous people, to live in accordance with their own values and priorities;
- The use of, and access to, culturally important areas and landscapes;
- The access to existing human and commercial services and housing;
- The ability to participate in regional and local employment and training opportunities;
- The new Project workforce and their families; and
- Strategies to foster cross-cultural awareness for the Project and its participants.

The effects of the Project on local and regional residents, including land acquisition and relocation issues and property valuation and marketability, community services and recreational activities should be described for the construction and operational phases of the development.

The potential environmental harm on the amenity of adjacent areas used for cropping, grazing, forestry, recreation, industry, education, aesthetics, or scientific or residential purposes should be discussed. The implications of the Project for future developments in the local area including constraints on surrounding land uses should be described.

An assessment of the predicted impacts of the Proponent's activities (including activities by any sub-contractors) on the local and regional housing markets should also be undertaken. The assessment should refer to the projected accommodation needs for the Project in both the construction and operational phases, and estimate:

- The capacity of local and regional housing markets to meet the accommodation needs of the Project, including the potential displacement of low-income residents from affordable rental accommodation and diminished availability of accommodation;
- Any possible cumulative impacts on the local and regional housing market due to the presence of other existing or proposed major projects in the area, and seasonal employment factors; and
- The impact of the construction phase of the Project on the local and regional residential development and housing construction industry, with particular reference to the demand for local contractors.

Mitigation and enhancement strategies should be provided for any identified impacts to social values. Practical monitoring regimes should also be recommended.

3.11 Economic Environment

3.11.1 Description of Environmental Values

This section should describe the existing economic environment that might be affected by the Project.

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

- Economic viability, including economic base and economic activity, future economic opportunities, current local and regional economic trends, in particular drought and rural downturn etc.;
- Nature and scale of local and regional industries, including petroleum exploration and development;
- Identification of existing labour force and unemployment statistics;
- Existing housing market, particularly rental accommodation which may be available for the Project workforce;
- Types and numbers of businesses;
- Existing property and land values;
- Availability and prices of goods and services;
- Availability of suitable land for support industrial uses; and
- Historical descriptions of large-scale resource developments and their effects in the region.

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

3.11.2 Potential Impacts and Mitigation Measures

An economic analysis, including a cost-benefit analysis, should be presented from national, state, regional and local perspectives as appropriate to the scale of the Project. The general economic benefits from the Project should be described, including estimated total economic costs for materials, labour and infrastructure for the construction, operation and rehabilitation phases.

The analysis of general economic impacts of the Project should include:

- The relative significance of this Project in the local and regional economic context.
- The long and short-term beneficial (e.g. job creation) and adverse (e.g. impacts to petroleum development, competition with local small business) impacts that are likely to result from implementation of the proposed development;
- The potential, if any, for direct equity investment in the Project by local businesses or communities;
- The cost to all levels of government of any additional infrastructure provision.
- Implications for future development in the locality, including constraints on surrounding land uses, resource development and existing industry;
- The distributional effects of the Project, including proposals to mitigate any negative impact on disadvantaged groups;
- The extent to which local and other Australian goods and services will be used;
- The value of lost opportunities or gained opportunities for other economic activities

- anticipated in the future; and
- Impacts on local property values.

The effect on local labour markets should be discussed with regard to the number and source of the workforce. This information should be presented according to occupational groupings of the workforce and show anticipated peaks in numbers during the construction period. This information should include an estimate of the anticipated numbers of workers who will be accompanied by dependents, as well as those who will be unaccompanied (i.e. single workers).

The impacts of both construction and operational workforces and associated contractors on housing demand should be addressed and include:

- An accommodation strategy for the construction workforce, which addresses the estimated housing needs of both single and accompanied construction workers;
- Details of the size, location and management of any temporary worker accommodation that will be required either on-site or off-site;
- Maps, as necessary, to illustrate the location of any proposed construction workers' accommodation on-site or in the vicinity of the Project;
- The capability of the existing housing stock, particularly rental accommodation, to meet any additional demands created by the Project; and
- The capacity of water supply and sewerage systems to service any new residential development and any Project proposals to supplement this infrastructure.

Any new skills and training to be introduced in relation to the Project should be identified, particularly opportunities for private investment in training. Adequate provision should be made for apprenticeship and worker training schemes, including consideration of a skills development and training strategy to assist disadvantaged groups as well as local residents.

The EIS should include 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, Local Industry Policy”.

Consideration of the impacts of the Project in relation to energy self-sufficiency, security of supply and balance of payments benefits may be discussed. Attention should be directed to the long and short-term effects of the Project (including UCG closure) on the regional income and employment and the state economy, including on the land-use of the surrounding area and existing industries, regional income and employment and the state economy.

3.12 Health and Safety

3.12.1 Description of Environmental Values

This section should describe the existing community values for public health and safety that might be affected by the Project. 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.

3.12.2 Potential Impacts and Mitigation Measures

This section should detail any impacts of the Project on the health and safety of the community, workforce, suppliers and other stakeholders, in terms of health, safety, quality of life from factors such as air emissions, dust, noise and pests. It should include details of:

- How compliance with relevant Health & Safety legislation will be achieved (e.g. for the UCG site – *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act));
- Security arrangements;
- Emergency plans and safety management strategies, as well as corroboration of the effectiveness of such systems;
- Details of on-site emergency response capabilities (e.g. on-site paramedic or first-aid officer), for both the construction and operational phases of the Project, which should include personnel trained for fire suppression and containment, rescue and first aid; and
- The risk assessment conclusions reached and the level of off-site risk from the proposed developments.

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. petroleum exploration and production). 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 Project, 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. An assessment should be made of any areas where mosquitoes may breed (e.g. areas with poor drainage or water ponds) and mitigation measures developed to prevent the harbourage and breeding of mosquitoes and other pests of public health significance. The EIS should include a discussion on the site planning, management, mitigation and monitoring of potential pest impacts by considering *Division 2 of Part 1A of the Public Health Regulation 2005*. This section should draw on the information in Queensland Health's "Guidelines to Minimise Mosquito and Biting Midge Problems in New Development Areas (March 2002)".

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.

3.13 Hazard and Risk

3.13.1 Hazard and Risk Analysis

This section of the EIS should describe the potential hazards and risks that may be associated with the Project. A preliminary hazard analysis should be conducted for the Project in accordance with the “Hazardous Industry Planning Advisory Paper No. 8 – HAZOP Guidelines, NSW Department Urban Affairs and Planning” or a similar standard and should take into account of “State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP1/03)”.

The preliminary hazard analysis should incorporate:

- Possible hazards, accidents, and abnormal events that may arise for the Project, during construction, operation and decommissioning, including potential protest activity. This should include accidental release of hazardous materials, explosions and fires, or subsidence of UCG area. It may include seismic stability of the Project area and the vulnerability of the Project to flooding, bushfire and landslip, as well as potential wildlife hazards such as snakes and disease vectors;
- Analysis of the consequences of each of these events on safety to workers and the public, and environmental damage in the Project area, particularly in the vicinity of the Project and associated infrastructure facilities;
- The likelihood of these consequences being experienced, both individually and collectively;
- Presentation of risk and risk contours (preferably quantitative levels) from the above analysis in accordance with the protocol used in “Industrial/Residential Interface Buffer Arrangements, Wynnum (Peter J Turnbull Pty Ltd & UniQuest Ltd, April 1999)”;
- Safeguards that will be employed or installed to reduce the likelihood and severity of hazards, consequences and risks to persons, fauna and environmentally sensitive sites in the Project area. Where possible, the reduced level of risk which would be experienced with these safeguards in place should be indicated;
- Comparison of assessed and mitigated risks with acceptable risk criteria for land uses adjacent to Project activities;
- Identification of dangerous goods (as classified in the *Dangerous Goods Safety Management Act 2001* and *Dangerous Goods Safety Management Regulation 2001*) to be used, stored, processed or produced and the rate of usage; and
- An overview of the objectives and management principles to be adopted for the preparation of a detailed emergency plan (including emergency response and recovery/cleanup procedures), in consultation with the relevant emergency services.

The EIS should deal comprehensively with on-site and off-site risks. External risks to the Project should also be considered including risks from natural hazards as determined on the basis of “AS/NZ Risk Management Standard 4360:1999”. Studies should address risks to all phases of

the Project (i.e. construction, operation and decommissioning).

The Proponent should carry out a risk assessment in accordance with relevant standards (e.g. "AS 3814 Industrial and Commercial Gas-fired Alliances") and guidelines of the responsible authority as appropriate.

Any changes to operating or storage procedures that would reduce the possibility of these events occurring, or reduce the severity of the events should they occur, are to be identified and adopted where appropriate. A set of representative incident scenarios should be selected. This set should initially include worst case scenarios (e.g. a catastrophic failure of a storage vessel or processing unit).

The acceptability of the risk to surrounding land uses should be assessed by referring to nationally-adopted risk criteria presented in the New South Wales Department of Urban Affairs and Planning's "Hazardous Industry Planning Advisory Paper No. 4 Risk Criteria for Land Use Safety Planning".

3.13.2 Safety Management

Safety management strategies and control measures to be used to minimise the risks of incidents on and off-site and to minimise the consequences of any incident under known operating conditions should be included in the EIS. Matters addressed in the P&G Act and "SafeOP for Petroleum and Gas – a Guide to Legislative Requirements for Operating Plant" should be considered. This information should include:

- The prevention and handling of fires on Project sites;
- The segregation of incompatible products and ingredients;
- The containment of hazardous materials;
- The collection, treatment and disposal of any spillage of hazardous materials and wastes, including details of the design, volume and capacity of any retention ponds, process tanks, waste holding tanks or bunded areas;
- The collection, treatment and proposed disposal methods for gas or liquid by-products which are not used as part of the on-site process. These by-products should be clearly identified and any hazards associated with them delineated;
- Emergency response procedures developed specifically to deal with spills or fires involving toxic material, which may result in toxic fumes being released to the atmosphere;
- An assessment of toxic materials produced as a result of the operations process by an appropriately qualified person to develop procedures and determine the required level of controls, including Personal Protective Equipment required for dealing with such material;
- The application of safety distances to the various activities on Project sites to minimise consequences of incident;
- Quality control of products and raw materials on Project sites, including handling of non-conforming material;
- Maintenance of critical items of equipment;

- The competency requirements and training needs of operatives; and
- Emergency procedures, including evacuation procedures where necessary.

3.13.3 Emergency Management Plan

An outline of the proposed emergency management procedures should be provided for the range of situations identified in the above risk assessment where there are measurable risks. The following should also be presented:

- An overview of the design and operation of proposed safety systems, including fire prevention and protection, leak detection and minimisation, and emergency shutdown systems and procedures;
- The need for any permit under the *Building Act 1975*, or any permit or requirements to store flammable and combustible liquids, with reference to the P&G Act and the *Dangerous Goods Safety Management Act 2001*;
- Contingency plans to deal with hydrocarbon (e.g. diesel, lubricating oils) spills or flammable gaseous leaks during construction, operation and decommissioning of the Project;
- Contingency plans to account for natural disasters such as storms, floods and fires during the construction, operation and decommissioning phases;
- Measures to prevent combustion of in situ and stockpiled raw materials, products or process elements should be described;
- On-site fire fighting equipment provided and the level of training of staff (if any) who will be tasked with emergency management activities;
- Detailed maps of the coal gasification and power generation components, and compressor sites showing the plant outline, hazardous material store, incident control points, fire fighting equipment, etc.;
- Details of any dangerous goods stores associated with the coal gasification and power generation components operations, and compressor station, including fuel storage and emergency response plans;
- Emergency planning and response procedures that have been determined in consultation with state and regional emergency service providers; and
- Plans for involvement of the relevant state agencies (such as the Department of Mines and Energy, the Department of Emergency Services, Queensland Fire and Rescue Authority Services and Queensland Ambulance Service) in relation to emergency medical response and transport and first aid matters.

3.14 Cumulative Impacts

The purpose of this section is to provide clear and concise information on the overall impacts of the Project. In addition, the cumulative impacts that could occur as a consequence of the Project in conjunction with the development of other proposals that are currently under study should be considered, including the interrelationship of these impacts as they relate to particular issues (e.g. water, air, noise, cultural heritage, social, economic etc.). These impacts should be considered over time or in combination with other impacts because of the scale, intensity, duration or frequency of the impacts.

In particular, the requirements of any relevant State Planning Policies, Environmental Protection Policies, National Environmental Protection Measures and other strategies and regulations should be addressed in assessing the cumulative impacts of the Project on the existing environment.

4. ENVIRONMENTAL MANAGEMENT PLANS

This section of the EIS should present draft environmental management plans (EMPs) developed for the Project. It is expected that all EMPs will, where relevant, be prepared in accordance with the EPA Guidelines “Preparing Environmental Management and site based Management Plans” and the draft EPA Guideline: “Preparing an Environmental Management Plan for Level 1 Petroleum Activities”. Separate EMPs should individually address the discrete Project elements such as the plant, transmission pipeline corridor and injection sites. The EMPs should be developed from the preceding information in the EIS.

An EMP should provide life-of-Project control strategies 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 Proponent 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 Australian Government authorities, stakeholders and the Proponent 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 will 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 define the achievement of the objective;
- An action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
 - continuous improvement;
 - environmental auditing;
 - monitoring;
 - reporting;
 - staff training; and
 - a decommissioning program for land proposed to be disturbed under each relevant aspect of the Project.

CONCLUSIONS AND RECOMMENDATIONS

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

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). This standard lists references by presenting in the following order: author (date of publication) title, publisher, and place of publication.

RECOMMENDED APPENDICES

Final Terms of Reference

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

Development Approvals

A list of the development approvals required by the Project should be provided.

EPBC Act Report

A stand alone report addressing potential impacts of the Project on matters of national environmental significance is recommended.

Research

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

Consultation Report

A list of advisory agencies should be provided in a summary Consultation Report, which should also list the Australian, 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.

Study Team

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

Glossary of Terms

A glossary of technical terms and acronyms should be provided.

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, including the subregional analysis of representativeness and adequacy of protection for the terrestrial/riparian vegetation communities and their component flora and fauna taxa within the affected areas;
- An integrated assessment of relative biodiversity/conservation values, based on the methodology outlined in “Biodiversity Assessment and Mapping Methodology (EPA 2002”;
- Air pollution, noise and vibration;
- Transport and traffic studies, including road impact assessments investigations;
- Housing and accommodation studies;
- Economic studies and/or cost-benefit analyses; and
- Hazard and risk studies.

Corporate Environmental Policy

Linc Energy should attach a copy of its corporate environmental policy and planning framework document.

List of Proponent Commitments

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