

Terms of reference for an environmental impact statement

Shell Australia LNG Project

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

The Coordinator-General
January 2010



Contents

Contents	2
Synopsis	5
Abbreviations	6
Glossary of terms.....	10
Part A—General information and administrative procedures	13
1. Project summary.....	13
Feed gas transmission line.....	14
LNG plant and terminal facilities.....	14
Associated infrastructure.....	14
2. Project proponent	18
3. Legislative framework.....	18
4. Terms of reference	20
5. EIS objectives.....	20
6. General EIS guidelines.....	21
7. Stakeholder consultation	23
8. EIS format and copy numbers	23
9. Further information	23
Part B—Specific requirements and structure of the EIS	24
Executive summary.....	24
Glossary of terms.....	24
1. Introduction	25
1.1 Project proponent.....	25
1.2 Project description	25
1.3 Project rationale	25
1.4 Relationship to other projects.....	26
1.5 Alternatives to the project	26
1.6 Co-location opportunities	26
1.7 The environmental impact assessment process	27
1.7.1 Methodology of the EIS.....	27
1.7.2 Objectives of the EIS.....	27
1.7.3 Submissions.....	27
1.8 Public consultation process.....	27
1.9 Project approvals	28
1.9.1 Relevant legislation and policy requirements.....	28
1.9.2 Planning processes and standards.....	30
1.9.3 Accredited process for controlled actions under Australian Government legislation.....	30
2 Description of the project.....	31
2.1 Overview of project	31
2.1.1 Gas transmission pipeline	31
2.1.2 LNG plant and terminal facilities	31
2.1.3 Government infrastructure	32
2.2 Location	32
2.2.1 Regional context	33
2.2.2 Local context	33
2.2.3 Route selection process for proposed transmission pipeline route	33
2.2.4 Gas transmission pipeline co-location opportunities.....	34
2.3 Construction.....	34
2.3.1 Feed gas transmission pipeline	35
2.3.1.1 Pre-construction activities	35



2.3.1.2	Feed gas transmission pipeline parameters	35
2.3.1.3	Feed gas transmission pipeline coastal/marine works	36
2.3.2	LNG plant and terminal facilities	37
2.3.2.1	On-shore construction	37
2.3.2.2	Coastal/marine construction	37
2.3.2.3	Dredging and dredged material disposal	38
2.4	Operations	38
2.4.1	Feed gas transmission pipeline	38
2.4.2	LNG plant and terminal facilities	39
2.4.2.1	LNG plant	39
2.4.2.2	Terminal facilities	39
2.5	Associated infrastructure	40
2.5.1	Workforce and accommodation	40
2.5.2	Transport	40
2.5.3	Water supply and storage	40
2.5.4	Stormwater drainage	41
2.5.5	Sewerage	41
2.5.6	Energy	41
2.5.7	Telecommunications	41
2.6	Decommissioning and rehabilitation	41
2.6.1	Gas transmission pipeline	41
2.6.2	LNG plant and terminal facilities	42
3	Environmental values and management of impacts	42
3.1	Climate and climate change adaptation	43
3.1.1	Climate	43
3.1.2	Climate change adaptation	43
3.2	Land	43
3.2.1	Topography, geomorphology and geology	44
3.2.1.1	Description of environmental values	44
3.2.1.2	Potential impacts and mitigation measures	44
3.2.2	Soils	44
3.2.2.1	Description of environmental values	44
3.2.2.2	Potential impacts and mitigation measures	45
3.2.3	Land use and tenure	45
3.2.3.1	Description of environmental values	45
3.2.3.2	Potential impacts and mitigation measures	46
3.2.4	Landscape character and visual amenity	47
3.2.4.1	Description of environmental values	47
3.2.4.2	Potential impacts and mitigation measures	47
3.2.5	Land contamination	48
3.2.5.1	Description of environmental values	48
3.2.5.2	Potential impacts and mitigation measures	48
3.2.6	Land disturbance	49
3.3	Nature conservation	49
3.3.1	Sensitive environmental areas	49
3.3.2	Terrestrial flora	51
3.3.3	Terrestrial fauna	53
3.3.4	Freshwater aquatic flora and fauna	55
3.3.5	Marine flora and fauna	56
3.4	Water resources	57
3.4.1	Surface water and watercourses	57
3.4.2	Groundwater	59
3.5	Coastal environment	60
3.5.1	Marine water and sediment	60
3.5.2	Coastal processes	62
3.6	Air quality	62
3.6.1	Description of environmental values	62



3.6.2	Potential impacts and mitigation measures	63
3.6.3	Greenhouse gas emissions and abatement	65
3.7	Noise and vibration	66
3.7.1	Description of environmental values	66
3.7.2	Potential impacts and mitigation measures	66
3.8	Waste.....	67
3.8.1	Waste generation	67
3.8.2	Waste management.....	67
3.9	Transport.....	68
3.9.1	Existing transport infrastructure	68
3.9.2	Transport tasks and routes	68
3.9.3	Potential impacts and mitigation measures	69
3.9.4	Proposed infrastructure alterations	70
3.9.5	Road management planning	71
3.9.6	Shipping	71
3.9.7	Air services.....	72
3.10	Indigenous cultural heritage.....	73
3.10.1	Description of indigenous cultural heritage values	73
3.10.2	Potential impacts and mitigation measures	73
3.11	Non-indigenous cultural heritage	74
3.11.1	Description of non-indigenous cultural heritage values	74
3.11.2	Potential impacts and mitigation measures	74
4	Social values and management of impacts	76
4.1	Social	76
4.1.1	Social and cultural area.....	76
4.1.2	Community engagement.....	76
4.1.3	Social baseline study	76
4.1.4	Workforce profile	78
4.1.5	Potential impacts.....	78
4.1.6	Mitigation measures and management strategies	79
4.2	Health and safety	81
4.2.1	Description of environmental values	81
4.2.2	Potential impacts and mitigation measures	81
5	State and local economies and management of impacts.....	82
5.1	Economy	82
5.1.1	Description of affected local and regional economies	82
5.1.2	Potential impacts and mitigation measures	82
5.2	Sustainable development.....	83
6	Hazard and risk	84
6.1	Hazard and risk assessment.....	84
6.1.1	Feed gas pipeline.....	84
6.1.2	LNG plant and LNG transport	85
6.1.3	Cumulative risk.....	86
6.2	Emergency management plan	86
7	Cumulative impacts	88
8	Matters of national environmental significance	89
8.1	Impacts on World Heritage properties and National Heritage places	89
8.2	Impact on a listed threatened species and ecological communities.....	90
8.3	Impact on a listed migratory species	91
8.4	Format of MNES Section	91
9	Environmental management plan.....	93
10	Conclusions and recommendations.....	96
11	References	96
12	Recommended appendices	96



Synopsis

Shell CSG (Australia) Pty Ltd (Shell Australia), a wholly owned indirect subsidiary of Royal Dutch Shell plc (Shell), is investigating the development of a liquefied natural gas (LNG) facility on Curtis Island on the central Queensland coast, opposite Gladstone. It will utilise gas resources supplied from coal seam gas (CSG) developments in the Surat and Bowen basins in South East and Central Queensland. A proposed gas pipeline from the Gladstone City Gate¹ to Curtis Island will supply gas to the LNG plant where it will be processed, cooled and stored in LNG tanks for subsequent loading onto LNG carriers via a jetty and export to international markets.

Shell jointly owns CSG tenements in Queensland with Arrow Energy Ltd (Arrow Energy), which will supply the Shell Australia LNG Project. The project is designed to allow for expansion from expected additional exploration and production success in the future from both the Shell and Arrow Energy CSG tenements, and also potentially from other CSG acreage holders and/or developers. Shell and Arrow Energy are working together to investigate LNG developments in Queensland. Shell is a global leader in LNG production, transportation and supply.

The Coordinator-General declared the project to be a significant project for which an environmental impact statement (EIS) is required in accordance with Part 4 of the *State Development and Public Works Organisation Act 1971* on the 12 June 2009.

The Australian Government has determined that the project constitutes a controlled action pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act).

The declaration of the project as a significant project does not indicate support for, or approval of, the project by the Coordinator-General or the Queensland Government. Rather, it is a requirement for the project to undergo a rigorous EIS process. The EIS process is being coordinated by the Department of Infrastructure and Planning on behalf of the Coordinator-General.

Terms of reference (TOR) for an EIS set out the requirements, both general and specific, that the proponent should address in preparing the EIS. These TOR have been prepared having regard to comments/submissions received on draft TOR released for public comment over the period 2 October 2009 – 2 November 2009. The TOR are presented in two broad categories:

- Part A—General information and administrative procedures
- Part B—Specific requirements and structure of the EIS.

¹The Gladstone City Gate or a new facility in the vicinity is the point at which Shell Australia would take coal seam gas supply from the pipeline operators. The Gladstone City Gate is the gas sales point for existing pipeline operators.



Abbreviations

The following abbreviations have been used in this document:

ACH Act	<i>Aboriginal Cultural Heritage Act 2003</i>
AHD	Australian Height Datum
Shell	Shell CSG (Australia) Pty Ltd
ANZECC	Australian and New Zealand Environment and Conservation Council
CAMBA	China-Australia Migratory Bird Agreement (Cwlth)
CG	Coordinator-General of the State of Queensland
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CQSS2	<i>Central Queensland Strategy for Sustainability – 2004 and Beyond</i>
CSG	Coal seam gas
DEEDI	Queensland Department of Employment, Economic Development and Innovation
DEWHA	Australian Government Department of Environment, Water, Heritage and the Arts
DERM	Queensland Department of the Environment and Resource Management
DIP	Queensland Department of Infrastructure and Planning
DME	Mines and Energy, Queensland Department of Employment, Economic Development and Innovation
DMR	Main Roads, Queensland Department of Transport and Main Roads
DPIF	Primary Industries and Fisheries, Queensland Department of Employment, Economic Development and Innovation
DTMR	Queensland Department of Transport and Main Roads
draft TOR	Draft terms of reference as defined by Part 4 of the <i>State Development and Public Works Organisation Act 1971</i>



EIS	Environmental impact statement as defined by Part 4 of the <i>State Development and Public Works Organisation Act 1971</i>
EM Plan	Environmental management plan
EMR	Environmental management register
EP Act	<i>Environmental Protection Act 1994</i>
EPA	Queensland Department of the Environment and Resource Management (formerly Environmental Protection Agency)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth)
EPP (Air)	Environmental Protection (Air) Policy 2008
EPP (Noise)	Environmental Protection (Noise) Policy 2008
EPP (Waste)	Environmental Protection (Waste Management) Policy 2000
EPP (Water)	Environmental Protection (Water) Policy 1997
EPSD	<i>Environment Protection (Sea Dumping) Act 1981</i> (Cwlth)
ERA	Environmentally Relevant Activity
ESD	Environmentally sustainable development
FEED	Front end engineering design
GBRWHA	Great Barrier Reef World Heritage Area
GPC	Gladstone Ports Corporation Limited
GQAL	Good quality agricultural land in <i>State Planning Policy 1/92: Development and the Conservation of Agricultural Land</i>
GSDA	Gladstone State Development Area
IAS	Initial advice statement as defined by Part 4 of the <i>State Development and Public Works Organisation Act 1971 (Qld)</i>
IPA	<i>Integrated Planning Act 1997</i>
JAMBA	Japan-Australia Migratory Bird Agreement (Cwlth)
kWm²	Kilowatts per square metre
LAT	Lowest Astronomical Tide
LNG	Liquefied natural gas



LPG	Liquefied petroleum gas
MNES	Matters of national environmental significance, as defined under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth)
MOF	Marine offloading facility
MRA	<i>Mineral Resources Act 1989</i>
MSQ	Maritime Safety Queensland
Mtpa	Million tonnes per annum
NAGD	National Assessment Guidelines for Dredging (DEWHA, 2009)
NCA	<i>Nature Conservation Act 1992</i>
NEPM	National Environmental Protection Measure
NRW	Natural Resources and Water, Queensland Department of the Environment and Resource Management
NTRB	Native Title Representative Bodies
P&G Act	<i>Petroleum and Gas (Production and Safety) Act, 2004</i>
PFL	Petroleum facility licence (under P&G Act)
PJ	Petajoule (10^{15}) joule
psi	Pound per square inch
RHM	Regional Harbour Master (Qld)
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement (Cwlth)
ROW	Right of way
SPP 1/03	<i>State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide</i>
SPP 2/02	<i>State Planning Policy 2/02 Planning and Managing Development Involving Acid Sulfate Soils</i>
TJ	Terajoule (10^{12}) joule
The Act	<i>State Development and Public Works Organisation Act 1971</i>
The project	Shell Australia LNG Project
The proponent	Shell CSG (Australia) Pty Ltd



TOR

Terms of reference as defined by Part 4 of the *State Development and Public Works Organisation Act 1971*



Glossary of terms

Acid sulfate soils	Naturally occurring soils, sediments or organic substrates (e.g. peat) that are formed under waterlogged conditions. These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. In an undisturbed state below the water table, acid sulfate soils are benign. However if the soils are drained, excavated or exposed to air by a lowering of the water table, the sulfides will react with oxygen to form sulfuric acid.
Berth pocket	An area of water adjacent to a wharf, in a port or harbour, used specifically for berthing vessels.
Bioregion	An ecologically and geographically defined area smaller than a 'realm' or 'ecozone' (also known as an eco-region). Bioregions are defined through common physical and environmental features, including watershed boundaries and soil and terrain characteristics.
Catchment	The term used to describe the area which is drained by a river. It is sometimes called the river basin or watershed. The size of the catchment is the most significant factor determining the amount or likelihood of flooding.
Climate change	Any long-term significant change in the 'average weather' that a given region experiences. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.
Coal seam gas	A form of natural gas extracted from coal beds, primarily methane.
Contingent resources	Those quantities of hydrocarbons which are estimated, on a given date, to be potentially recoverable from known accumulations, but which are not currently considered to be commercially recoverable. Contingent resources may be of a significant size, but still have constraints to development. These constraints, preventing the booking of reserves, may relate to lack of gas marketing arrangements or to technical, environmental or political barriers.
Controlled action	A term used under the <i>Environment Protection and Biodiversity Conservation Act, 1999</i> (Cwlth) to determine whether an action is likely to have an impact on matters of national environmental significance. If a project is declared a 'controlled action', development approval is required from the Minister for Environment, Heritage and the Arts.
Cultural heritage	The legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.



Economic impact assessment	Assessment of the measured effect of an impacting agent on the economy of a region.
Ecosystem	A natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment.
Emissions	Release of pollutants to air.
Environmental impact assessment	The process used to assess the environmental impact of a proposed development.
Environmental impact statement (EIS)	The information document prepared by a proponent when undertaking an environmental impact assessment. It is prepared in accordance with a terms of reference (TOR) prepared or approved by government.
Environmental management plan (EM Plan)	A document developed by proponents during a project's planning and design. An EM Plan provides life-of-project control strategies in accordance with agreed performance criteria for specified acceptable levels of environmental harm. It may continue through the whole life of a project (e.g. preconstruction, construction, operation and decommissioning).
Fauna	Animal life.
Flora	Plant life.
Greenhouse gas	The gases present in the earth's atmosphere which reduce the loss of heat into space and therefore contribute to global temperatures through the greenhouse effect.
Hazard	A hazard is usually a potentially harmful situation, although not usually the harmful event itself. Once the event has started it is classified as an emergency or incident.
Hydrocarbons	An organic molecule containing hydrogen and carbon, the major component of petroleum.
Initial advice statement	A document prepared for a proposed project that is submitted to the Coordinator-General so that a decision can be made as to whether the project should be declared a 'significant project' for which an Environmental Impact Statement is required' under Section 26 (1) (a) of the <i>State Development and Public Works Act, 1971 (Qld)</i> .
Liquefaction	Process of liquefying gas through cooling to approximately -160 °C followed by flashing to a low pressure.



Liquefied natural gas	Natural gas that has been converted to liquid form for ease of storage or transport. Liquefied natural gas takes up about 1/600 th the volume of natural gas at a stove burner tip. It is odorless, colorless, non-corrosive, and non-toxic. When vaporised, it burns only in concentrations of 5 per cent to 15 per cent when mixed with air. The density of LNG is roughly 0.41 to 0.5 kg/L at -164 °C.
LNG train	The purification and liquefaction components of an LNG facility. LNG facilities consist of one or more LNG trains.
Pilotage	The service of providing expert local maritime knowledge by a licensed pilot, to assist the master of a ship to safely navigate his vessel.
Receptors	Sensitive component of the ecosystem that reacts to, or is influenced by environmental stressors.
Regional ecosystem	Vegetation communities that are consistently associated with a particular combination of geology, land form and soil in a bioregion.
Rehabilitation	The process of environmental restoration after some process (business, industry, natural disaster etc.) has damaged it.
Remnant vegetation	Vegetation which is mapped by the Queensland Department of Environment and Resource Management (DERM) as being within a remnant endangered regional ecosystem, a remnant of concern regional ecosystem, or a remnant not of concern regional ecosystem map. Vegetation remaining after an area has been cleared or modified.
Risk	The potential impact of an event, determined by combining the likelihood of an event occurring, and the consequence if it were to occur.
Stakeholder	A person or organisation with an interest or stake in a project.
Topography	A description of the surface features of a place or region.
Wetland	The land area alongside fresh and salt waters, that is flooded all or part of the time.



Part A—General information and administrative procedures

1. Project summary

Due to increasing demand for cleaner energy and predicted worldwide energy deficits, natural gas is an important energy resource. Queensland has abundant coal seam gas (CSG) resources which have been developed to supply fuel for domestic power generation. With increasing reserves being proven, the potential to supply gas to the export market in the form of liquefied natural gas (LNG) has developed and a number of companies are examining the potential to liquefy CSG and ship this overseas.


The Surat and Bowen basins form part of the extensive black coal deposits of Central and South East Queensland. The Surat Basin coal deposits extend from Injune in Central Queensland to Dalby in South East Queensland. The Bowen Basin coal deposits extend from Collinsville to Theodore in Central Queensland. Significant CSG reserves are associated with these black coal deposits and they have the potential to supply large volumes of gas to the proposed LNG developments on Curtis Island. Approximately 250 000 PJ of CSG resources are estimated by the Australian Bureau of Agricultural and Resource Economics (ABARE) to be in eastern Australia.

Shell CSG (Australia) Pty Ltd (Shell Australia), a wholly owned indirect subsidiary of Royal Dutch Shell plc (Shell), is investigating the development of a LNG facility on Curtis Island on the central Queensland coast, opposite Gladstone. It will utilise gas resources supplied from CSG developments in the Surat and Bowen basins in South East and Central Queensland. A proposed gas pipeline from the Gladstone City Gate to Curtis Island will supply gas to the LNG plant where it will be processed, cooled and stored in LNG tanks for subsequent loading onto LNG carriers via a jetty and export to international markets.

Shell Australia jointly owns with Arrow Energy Ltd (Arrow Energy) CSG tenements in Queensland, which will supply the Shell Australia LNG Project. The project is designed to allow for expansion from expected additional exploration and production success in the future from both the Shell and Arrow Energy CSG tenements, and also potentially from other CSG acreage holders and/or developers.

Shell Australia and Arrow Energy are working together to investigate LNG developments in Queensland. Shell is a global leader in LNG production, transportation and supply, and recently acquired 30 per cent of Arrow Energy's resources, which include interests in CSG tenements, providing potential gas supply for LNG production.

The project may produce up to 16 Mtpa, involving phased construction of up to four LNG trains. A proposed feed gas pipeline from the Gladstone City Gate to Curtis Island will supply gas to the LNG plant where it will be processed, cooled and stored in LNG tanks for subsequent loading onto LNG carriers via jetties and export to international markets. The project will generate up to 2500-3000 jobs during construction and sustain around 200-300 jobs during operation. The project



comprises an LNG plant, LNG loading facility, feed gas pipeline from the Gladstone City Gate, and ancillary infrastructure including shipping channels, quarantine and temporary construction facilities and a materials offloading facility.

Feed gas transmission line

A high pressure feed gas pipeline from Gladstone City Gate to the LNG plant site will be constructed. The route may include a submarine crossing of Port Curtis or The Narrows. Metering stations will be at the Gladstone City Gate and LNG plant site.

LNG plant and terminal facilities

Gas will be transmitted in a pipeline from the Gladstone City Gate or new facility nearby to the LNG plant across Port Curtis by a route yet to be identified. Two options are being investigated— a direct route from near Fisherman's Landing to near Hamilton Point and an indirect route across The Narrows between Friend and Laird points.

Key features of the LNG plant and associated infrastructure include:

- The plant would be designed for a maximum capacity of 16 Mtpa, involving phased construction of up to four trains, each with a 3 Mtpa to 4 Mtpa capacity.
- Tankage, LNG and LPG storage and loading lines will be encompassed within the site.
- The LNG plant is to be designed to ensure flare and hazard zones are contained within the site.
- An LNG loading facility including jetties is to be located at North China Bay or Hamilton Point.
- A materials offloading facility is required at either North China Bay, Hamilton Point or Boatshed Point.
- Temporary facilities will be developed during construction including possible construction camp, construction offices, amenities, workshops and laydown areas, water and wastewater treatment and power generation facilities.

Associated infrastructure

The Department of Infrastructure and Planning (DIP) is developing the *Gladstone Port Western Basin Master Plan* to direct at a high level, the government's decisions on the nature of future development in the Western Basin. The master plan will investigate possible and proposed LNG plant locations and associated infrastructure corridors, common user channel and swing basin dredging, the timing/need for the outer channel and/or inner harbour duplication channel dredging, possible areas for the deposition of dredge spoil and the possible reclamation of other areas within the Western Basin.

Following from the outcomes of the master plan, the Port of Gladstone Western Basin Strategic Dredging and Disposal Project will seek to accommodate the long term dredging and dredged material disposal that is required to provide safe and efficient access to the existing and proposed port facilities in the harbour in the future. The development of the Western Basin incorporates dredging associated with the deepening and widening of existing channels and swing basins and the creation of new channels, swing basins and berth pockets. Material dredged during the

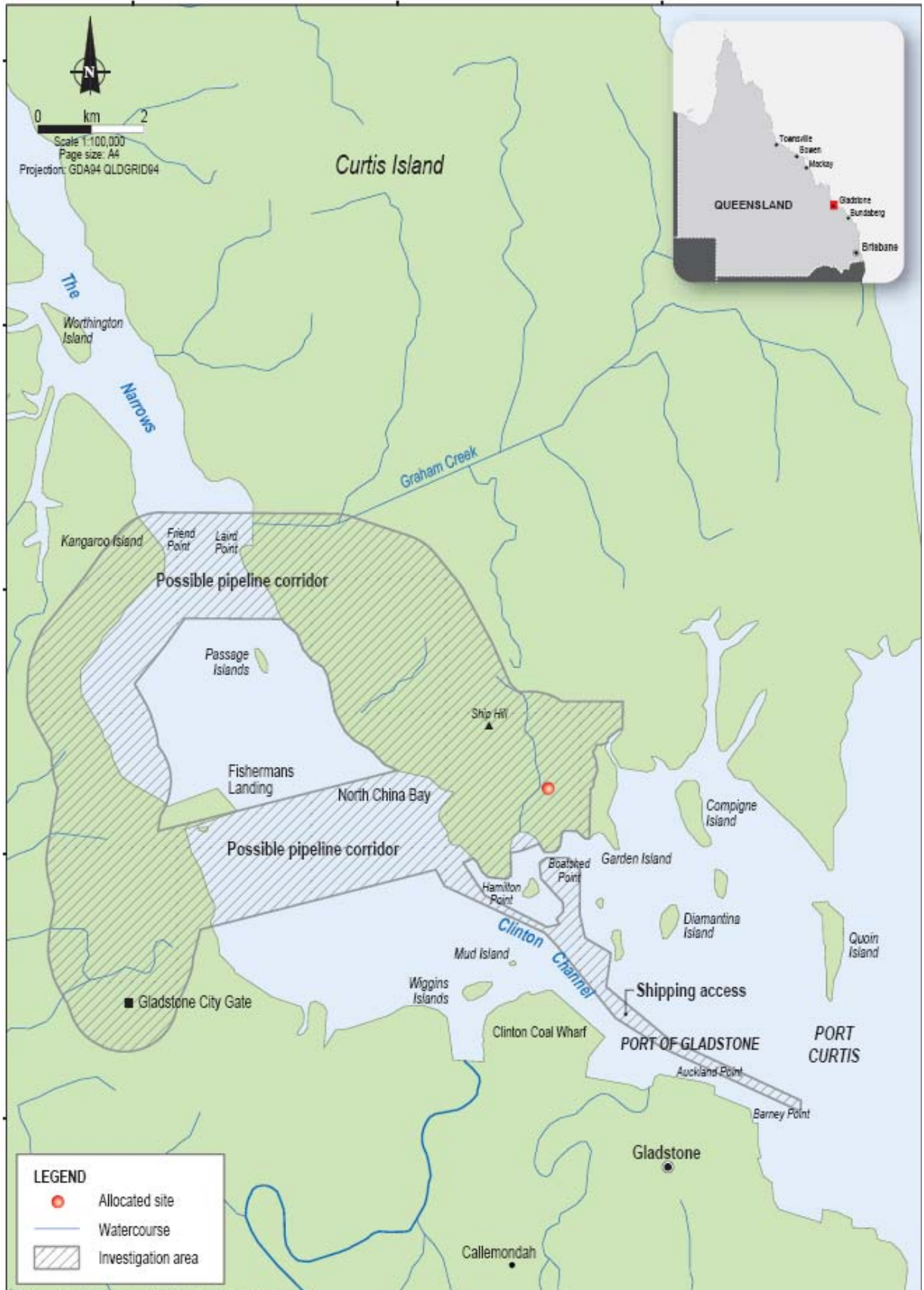


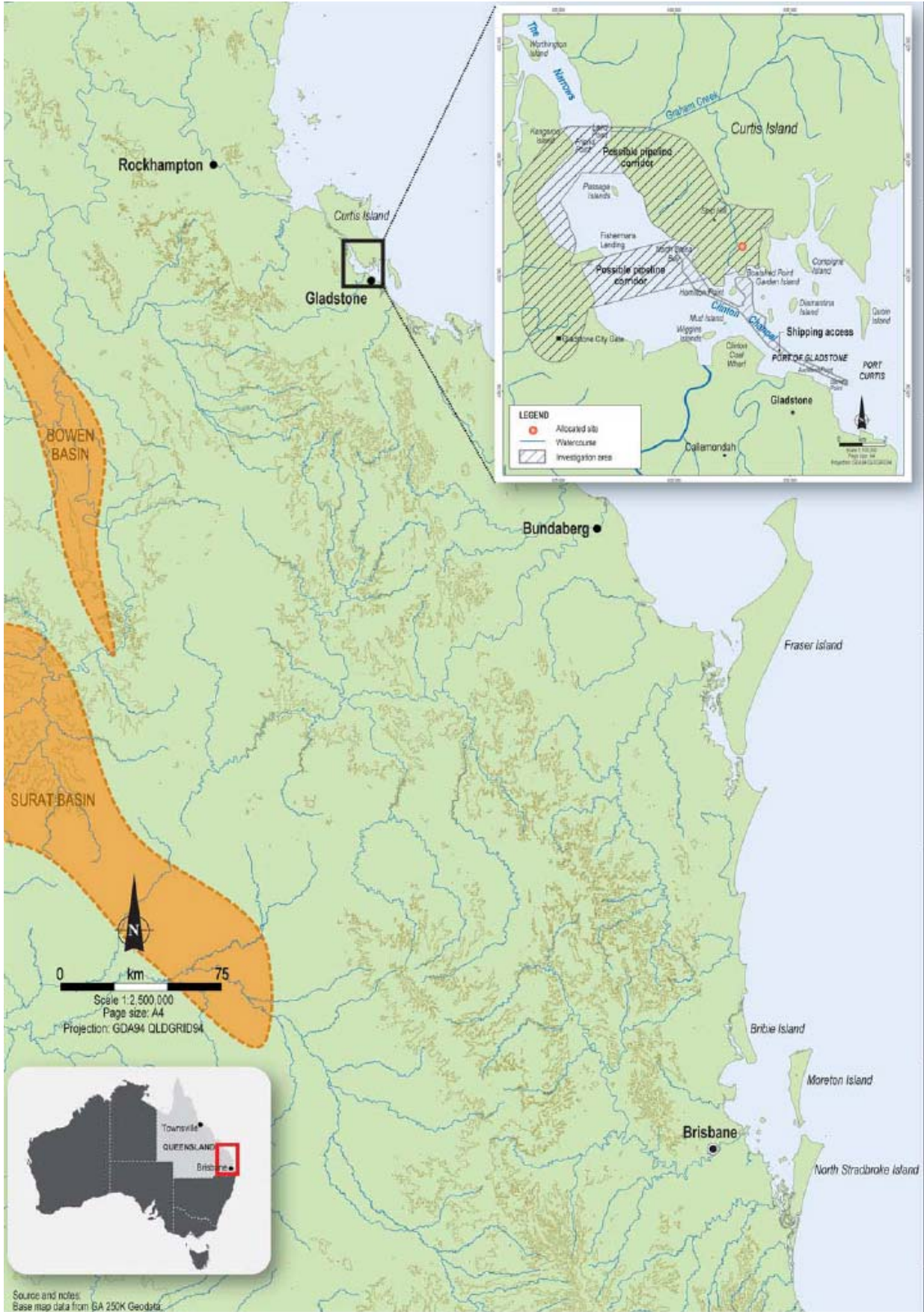
Western Basin development is proposed to be placed into reclamation areas to create a land reserve to be used to service the new port facilities. The proposed Western Basin reclamation is 10 km north of Gladstone immediately adjacent to the existing Fisherman's Landing reclamation and the proposed 153 ha Fisherman's Landing reclamation.

It is understood that capital dredging required to enable shipping access to an LNG plant in the Port of Gladstone will be provided by the Gladstone Ports Corporation (GPC) as part of an intended dredging program for the port.

The Port of Gladstone Western Basin Strategic Dredging and Disposal Project has been declared a significant project for which an EIS is required under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). As such, the impacts of the proposed dredging program will be separately assessed outside of the scope of the Shell Australia LNG Project.

Figure 1: Project development area





2. Project proponent

Shell CSG (Australia) Pty Ltd (Shell Australia), is a wholly owned indirect subsidiary of Royal Dutch Shell plc (Shell).

Shell CSG (Australia) Pty Ltd contact details are as follows:

Shell CSG (Australia) Pty Ltd
GPO Box 872K
MELBOURNE Vic 3001
Phone: . 03 8823 3720
Fax: 03 8823 4084
Email: salng-enquiries-au@shell.com

3. Legislative framework

On 11 May 2009, Shell CSG (Australia) Pty Ltd lodged an initial advice statement (IAS) and a request for 'significant project' declaration with the Queensland Coordinator-General (CG). The IAS provides an outline of the proposed project, including the project rationale and its potential impacts.

The project was declared a 'significant project' for which an environmental impact statement (EIS) is required' in accordance with Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) on 12 June 2009, by the CG.


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.

Shell CSG (Australia) Pty Ltd referred the project to the Australian Government Minister for the Environment, Heritage and the Arts to determine whether the project constituted a controlled action under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Referral Nos. EPBC 2009/5007 Development of a LNG Facility, Curtis Island and EPBC 2009/5008 Development of a High Pressure Gas Pipeline, Gladstone City Gate to Curtis Island).

On 21 August 2009, the projects were declared a 'controlled action' and the relevant controlling provisions are:

- sections 12 and 15A (World Heritage)
- sections 15B and 15C (National Heritage places)
- sections 18 and 18A (Listed threatened species and communities)
- sections 20 and 20A (Listed migratory species)

In accordance with the Minister's decision on the assessment approach, the project will be assessed under the bilateral agreement with the Queensland Government. Under the bilateral agreement, the Australian Government has accredited the Queensland SDPWO Act and EIS process to meet the impact assessment requirements under federal legislation.



Consequently, the term EIS used in these terms of reference (TOR) should be interpreted as satisfying the impact assessment requirements of all relevant Queensland and Australian Government legislation.

DIP is coordinating the EIS process on behalf of the CG. Relevant Australian, Queensland and local government authorities have been invited to participate in the EIS process as advisory agencies.

The first step in the impact assessment process under the Act is the development of TOR for the EIS. The process involves the formulation of draft TOR that are made available for public and advisory agency comment. This document represents the draft TOR for public and advisory agency comment. The CG will have regard to all properly made submissions received when finalising the TOR, which will be presented to the proponent.

The proponent will prepare an EIS to address the TOR. Once the EIS has been prepared to the satisfaction of the CG, comment on the EIS will be sought from the public and agencies. A public notice will be advertised in relevant newspapers inviting public comment. The notice will state where copies of the EIS can be viewed or purchased, the submission period and where the submissions should be sent.

The proponent may be required to prepare a supplementary EIS to address specific comments submitted by advisory agencies and members of the public.

At the completion of the EIS phase, the CG will prepare a report (CG report) evaluating the EIS and other relevant material, pursuant to section 35 of the Act. The CG report will include an assessment and conclusion about the environmental effects of the project and any associated mitigation measures. Material that will be assessed includes the EIS, properly made submissions and other submissions accepted by the CG, and any other material the CG thinks relevant to the project such as a supplementary report to the EIS, comments and advice from advisory agencies and other entities, technical reports and legal advice.


The CG report will be publicly notified by placing it on the DIP website at www.dip.qld.gov.au/projects. The CG report will also be presented to the proponent, the assessment manager/s under the *Integrated Planning Act 1971* (IPA), which is soon to be replaced by the *Sustainable Planning Act 2009* (SPA) or the *State Development and Public Works Organisation Act 1971* (SDPWO) Act) the Australian Government Minister for Environment, Water, Heritage and the Arts (under the EPBC Act), and the Minister for Natural Resources, Mines and Energy.

Under section 45 of the Act, the CG report may state conditions for the proposed petroleum authorities (petroleum leases, petroleum pipeline licences and petroleum facility licences) under the P&G Act. If CG conditions are included in the report:

- the CG must give the Minister responsible for the P&G Act a copy of the report
- the conditions of the proposed petroleum leases and licences are, subject to any inconsistency with native title conditions that have paramountcy under section 47 of the Act, taken to include the CG conditions.

Similarly, the CG report may, under section 49 of the Act, state conditions for any draft environmental authority under the *Environmental Protection Act 1994* (EP Act) for the proposed environmental authority (petroleum activities). If conditions are included in the report:

- the CG must give the Minister for the EP Act a copy of the report
- the environmental authority must include the conditions.



Finally, if the project involves development requiring an application for a development approval under IPA, soon to be replaced by the *Sustainable Planning Act 2009* (SPA) or the *State Development and Public Works Organisation Act 1971* (SDPWO) Act), the CG report may, under section 39 of the Act, state for the assessment manager one or more of the following:

- the conditions that must be attached to the development approval
- that the development approval must be for only part of the development
- 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.

The CG report must state the reasons if the application for development is to be refused.

4. Terms of reference

These TOR are for an EIS for the LNG project proposed by Shell Australia. The TOR have been prepared in accordance with the requirements of sections 29 and 30 of the Act and section 101 of the EPBC Act.

The objective of the TOR is to identify those matters that should be addressed in the EIS. The TOR are based on the outline of the proposed project provided in the IAS and the Commonwealth referrals.

While the interpretation of these TOR remains with the CG, 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 organisations and community interest groups as necessary during the preparation of the EIS.


The TOR should not be interpreted as excluding from consideration any matters that are currently unforeseen, may arise during ongoing scientific studies or may arise from any changes in the nature of the project during the preparation of the EIS, the community consultation process and associated documentation.

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 be included as a separate attachment to the main report.

The EIS should address, as a minimum, the requirements as set out in these TOR.

5. 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 or mitigated. Direct, indirect and cumulative impacts must be fully examined and addressed. The project should be based on sound environmental protection and management criteria.



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 document should provide information for the following persons and groups, as the project stakeholders:

- **for interested bodies and persons**—a basis for understanding the project, prudent and feasible alternatives, affected environmental values, impacts that may occur, and the measures to be taken to mitigate all adverse impacts
- **for groups or persons with rights or interests in land**—an outline of the effects of the proposed project on that land including access arrangements
- **for 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
- **for 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 to mitigate the effects of adverse environmental impacts of the development.

The proponent is required to address the TOR to the satisfaction of the CG before the EIS is made publicly available. It should be noted that the CG does not evaluate the EIS until public notification is completed and the CG has obtained any other material the CG considers relevant to the project, including additional information or comment about the EIS and the project from the proponent.

6. General EIS guidelines

The EIS is to provide 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, social and economic environment. It should be recognised that Australian, Queensland 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 of the project sites and any redundant infrastructure. Direct, indirect and cumulative impacts should be identified and assessed with respect to environmental values and potential extent of impacts. Cumulative impacts include impacts accumulating over time and impacts exacerbated by intensity or scale or frequency or duration of impacts both at project sites and areas remote from these.

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 project's objectives and rationale, as well as its relationship to strategic policies and plans
- a description of the entire project, including associated infrastructure requirements



- a description of feasible alternatives capable of substantially meeting the proposal'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 adverse and beneficial environmental impacts arising from the project relative to relevant environmental, social and economic values. The assessment should include examination of the consequences in relation 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
- responses to issues raised during public and stakeholder consultation.

The main EIS report needs to be supported by appendices containing relevant data, technical reports and other sources of the EIS 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
- 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 types of relevant 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.

The level of analysis and detail in the EIS should reflect the level of significance of the expected impacts on the environment. Any prudent and feasible alternatives should be discussed and treated in sufficient detail, and reasons for selection of the preferred option should be clearly identified.

7. Stakeholder consultation

The proponent is encouraged to provide opportunities for the general public to obtain information about, and comment on, the project through public information sessions.

As part of this EIS process, consultation should also be undertaken to better understand the social impacts of the proposed project and propose opportunities for mitigation of those impacts.

Specific requirements for stakeholder consultation are covered in [section 1.8](#) Part B.

8. EIS format and copy numbers

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. There should be clear demarcation between material in the EIS that refers to the separate project components (gas pipeline, infrastructure to Curtis Island, LNG plant and port facility development) to allow assessment agencies and other readers to differentiate between the project components.

The EIS should contain (possibly as part of the executive summary) a one page, brief guide as to where a range of categories of information for various readers are located in the report. This should particularly cover subjects that are presented in a number of places in the EIS.

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

Consideration should be given to publishing the EIS as a website in html format for the main body of the report with supporting material as PDF files.

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

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.

9. Further information

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

EIS Project Manager—Shell Australia LNG Project
Significant Projects Coordination
Department of **Infrastructure and Planning**
PO Box 15009 City East Qld 4002 Australia
tel + 61 7 3405 6205
fax + 61 7 3225 8282
email Shell@dip.qld.gov.au

www.dip.qld.gov.au



Part B—Specific requirements and structure of the EIS

It is preferred that the EIS generally follows the format and content outlined in this part of the TOR. If this is not possible, detailed cross-references describing where the EIS responds to the TOR should be included in the appendices.

Executive summary

The function of the executive summary is to convey the most important aspects and options relating to the project to the reader in a concise and readable form. It should use plain English and avoid the use of jargon and esoteric terms. The 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 follow that of the EIS, and focus strongly on the key issues and conclusions to enable the reader to obtain a clear understanding of the project and its potential adverse and beneficial environmental, social and economic impacts and the management measures to be implemented by the proponent to mitigate all residual impacts.

The executive summary should include:

- the title of the project
- name and contact details of the proponent, and a discussion of previous projects undertaken by the proponents 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 and need for the project, including the consequences of not proceeding with the project
- a description of 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), mitigation measures and environmental offsets and commitments to minimise the significance of these impacts
- detailed maps of the proposed project location.

Glossary of terms

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



1. Introduction

The introduction should clearly explain the function of the EIS, why it has been prepared and what it sets out to achieve. It should also define the audience to whom it is directed, and contain an overview of the structure of the document.

1.1 Project proponent

This section should describe the experience of the project proponent, including the nature and extent of business activities, experience and qualifications, role and responsibilities and environmental record, including the proponent's environmental policy.

1.2 Project description

This section should provide a brief description of the key elements of the project, particularly the feed gas transmission pipeline, the LNG plant and ancillary facilities, and associated infrastructure. The location of the project and its infrastructure requirements should be described and mapped. Detailed descriptions of the project should follow in section 2.

1.3 Project rationale

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, envisaged time scale for implementation and project life, anticipated establishment costs and actions already undertaken within the project area.

The rationale for the project should be described, with particular reference made to the economic and social benefits, including employment and flow-on business development, which the project may generate. The status of the project should be discussed in a regional, state and national context.

The interdependencies of the various project components should be explained, together with any infrastructure requirements that may affect the viability of the project.

Section 4 deals with social values, impacts and their management and section 5 deals with economic impacts and their management. This section should summarise the short and long-term:

- economic costs and benefits of the project to businesses and the wider community, including direct and indirect employment and local business involvement
- any increased demands on local and regional community services and facilities
- direct social costs and benefits, including community disruption, related land use changes, employment, skills development and any workforce accommodation issues
- any increased demand for natural resources as a result of the project.



1.4 Relationship to other projects

This section should also describe how the project relates to any other projects of which the proponent should reasonably be aware, that have been, or are being undertaken or that have been approved in the area affected by the project. In particular, mention should be made of any expansion of facilities at the Port of Gladstone and the relationship between the project and other LNG export projects planned for the Gladstone region.

Consequential impacts as defined under the EPBC Act, and projects which will be considered as part of cumulative impact assessment (section 7) should be identified and their relevance discussed.

1.5 Alternatives to the project

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

The reasons for selecting the preferred options should be outlined and include technical, commercial, social and environmental aspects where relevant. In particular, compliance with government policy and with the principles and objectives of ecologically sustainable development should be included in this discussion.

1.6 Co-location opportunities

The proponent should identify any third party proposals to develop infrastructure within the vicinity of the proponent's project investigation corridors. Such proposals would be limited to those projects which are in the public arena during the period of preparation of this EIS and for which a proponent can be readily identified.

DIP can, at the proponent's request, assist with the facilitation of meetings with proponents of other linear infrastructure or common user infrastructure in the project area. However, it is not the responsibility of DIP to provide the third party information to the proponent.

In particular the EIS should assess the co-location of the project pipeline with other pipelines crossing the Narrows of Port Curtis (see also 2.2.4).

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



1.7 The environmental impact assessment process

1.7.1 Methodology of the EIS

This section should outline the stages of the EIS process under the SDPWO Act, including information on the relevant stages of the approvals process, Commonwealth referrals, statutory and public consultation requirements, any associated licence or permit application processes and any interdependencies that exist between approvals (details of specific approvals should be presented under section 1.9). The information in this section is required to ensure:

- stakeholders are informed of the EIS process to be followed
- stakeholders understand the relationships between the EIS and other associated approvals
- stakeholders are aware of any opportunities for input and participation
- relevant legislation is addressed.

1.7.2 Objectives of the EIS

This section should provide a statement of the objectives of the environmental impact assessment process. The structure of the EIS can then be outlined as an explanation of how the EIS will meet its objectives. The purpose of the EIS is to:

- provide public information on the need for and likely effects of the project on the natural, social and economic environment
- identify relevant environmental values, impacts (both beneficial and adverse) on environmental values and propose mitigation measures, based on acceptable standards
- demonstrate how unavoidable environmental impacts can be managed through the protection and enhancement of the environmental values.


The role of the EIS in providing information for the formulation of the environmental management plan (EM Plan) for the project should be discussed. Discussion of options and alternatives is a key aspect of the EIS.

1.7.3 Submissions

The reader should be informed as to how and when public 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 submissions and what form the submissions should take (refer Part C).

1.8 Public consultation process

An appropriate public consultation program is an important component of the EIS process. The public consultation program should provide opportunities for community involvement and education. It may include interviews with individuals, public communication activities, interest group meetings, production of regular summary information and updates and other consultation mechanisms to encourage and facilitate active public consultation.



The public consultation process should identify broad issues of concern to local and regional communities and interest groups and address issues from project planning through to construction, commissioning and project operations.

A consultation plan should be prepared during the initial phase of the EIS process. This should identify:

- the types of activities to be undertaken
- timing
- target the stakeholder/community representatives
- integration with other EIS activities and the project development process
- consultation responsibilities
- communication protocols
- reporting and feedback arrangements.

This section should outline the results of consultation to:

- identify stakeholders and how their involvement was facilitated
- identify appropriate current and future consultation strategies and programs, including during the construction and operational phases of the project
- indicate how consultation involvement and outcomes were integrated into the EIS process and future site activities, including opportunities for engagement and provision for feedback and action if necessary.

Detailed results of the consultation process should be provided as a consultation report and presented as an appendix to the EIS. A summary of the key processes and outcomes should be provided in this section.

1.9 Project approvals

1.9.1 Relevant legislation and policy requirements

This section should identify and explain the legislation and policies controlling the approvals process and should identify all the approvals, permits and licences that will need to be obtained for the development of the proposed project including those on strategic port land and state development area land and environmental authorities for all parts of the project.

Key pieces of legislation that will need to be addressed in terms of implications for project approval include:

Australian Government

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

Civil Aviation Regulations 1988 and Civil Aviation Safety Regulations 1988

Environment Protection and Biodiversity Conservation Act 1999

Environment Protection (Sea Dumping) Act 1981

Native Title Act 1993



Queensland Government

Aboriginal Cultural Heritage Act 2003
Coastal Protection and Management Act 1995
Dangerous Goods Safety Management Act 2001
Environmental Protection Act 1994
Environmental Protection (Air) Policy 2008
Environmental Protection (Noise) Policy 2008
Environmental Protection (Waste Management) Policy 2000
Environmental Protection Regulation 2008
Environmental Protection (Waste Management) Regulation 2000
Environmental Protection (Water) Policy 2009
Explosives Act 1999
Fisheries Act 1994
Forestry Act 1959
Integrated Planning Act 1997
Land Act 1994
Land Protection (Pest and Stock Route Management) Act 2000
Local Government Act 1993
Marine Parks Act 2004
Marine Parks Regulation 2006
Nature Conservation Act 1992
Nature Conservation (Koala) Conservation Plan 2006
Nature Conservation (Protected Palnts) Conservation Plan 2000
Nature Conservation (Wildlife) Regulation 2006
Nature Conservation (Wildlife Management) Regulation 2006
Petroleum and Gas (Production and Safety) Act 2004
Queensland Heritage Act 1992
Soil Conservation Act 1986
State Development and Public Works Organisation Act 1971
State Planning Policy 1/92: Development and the Conservation of Agricultural Land.
State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils
State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide
Transport Infrastructure Act 1994
Transport Planning and Coordination Act 1994
Transport Operations (Road Use Management) Act 1995

Transport Operations (Marine Safety) Act 1994
Transport Operations (Marine Pollution) Act 1995
Vegetation Management Act 1999
Water Act 2000

1.9.2 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 section should refer to all relevant Queensland and regional planning policies. This information is required to demonstrate how the proposal conforms to state, regional and local plans for the area. In particular, the relevant planning schemes for the Gladstone State Development Area, the *Gladstone Port Western Basin Master Plan* and the *Curtis Coast Regional Coastal Management Plan* and the *Central Queensland Regional Growth Management Framework*. should be discussed.

1.9.3 Accredited process for controlled actions under Australian Government legislation

On the 21 July 2009, the proponent lodged two separate referrals with the Department of the Environment, Water, Heritage and the Arts for the following components of the project:

Referral number	Project component
2009/5007	LNG plant and ancillary facilities
2009/5008	Gas transmission pipeline

On the 21 August 2009 all project components were declared to be controlled actions under the Australian Government’s EPBC Act.

The relevant controlling provisions are:

EPBC 2009/5007 and EPBC 2009/5008

- World heritage (section 12 and section 15A)
- National heritage places (section 15B and section 15C)
- Listed threatened species and communities (section 18 and section 18A)
- Listed migratory species (section 20 and section 20A)

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 Part 8 of the EPBC Act. The EIS should address potential impacts on the matters of national environmental significance (MNES) that were identified when the project was determined to be a controlled action.

Section 8 outlines the requirements in relation to this matter.

2 Description of the project

The objective of this section is to describe the project (gas fields, pipeline, LNG plant, associated infrastructure, etc) through its lifetime of construction and operation and decommissioning (including rehabilitation). This information is required to allow assessment of all aspects of the project, including 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
- the employment benefits from the construction and operational phases of the project
- a summary of any environmental design features of the project.

2.1.1 Gas transmission pipeline

This section should provide a description of the proposed development of the high pressure gas transmission pipeline linking Gladstone City Gate with the LNG plant and the layout and location of key components including:

- the pipeline route selection and design process followed to select the preferred pipeline alignment
- a detailed description of pipeline construction and operation
- a detailed description of pipeline materials, sources and transport to the pipeline easement
- indicative locations of construction camps and pipeline lay down areas
- disposal of wastes including hydrostatic test water
- infrastructure services
- workforce and accommodation strategy.

2.1.2 LNG plant and terminal facilities

This section should provide a description of the LNG plant and terminal facilities and provide the layout of key components including:

- the site selection process and the attributes of the preferred site
- details of the construction and operation of the plant
- plans indicating the layout of the plant and associated facilities
- an outline of plant processes, water balances, and waste generation
- jetty and wharf facilities including ship loading and unloading equipment
- berths for tugs and other non-bulk carrier vessels

- ferry terminal
- materials offloading facility
- details of area to be dredged and dredged spoil disposal areas for berth pockets, turning basins and/or access channels, as required
- details of capital and maintenance dredging equipment and methods
- power lines, workshops, offices and warehouses
- fuel and chemical storage facilities
- LPG storage
- internal access roads
- water desalination treatment facility
- workforce and accommodation strategy.

2.1.3 Government infrastructure

This section should provide a description of facilities to be provided and activities to be undertaken by the Gladstone Ports Corporation (GPC) and other service providers as they directly apply to the project. This description applies to the marine facilities and infrastructure services that will not be provided by Shell Australia. It should be noted that these activities do not form part of the project:



- extensions to main shipping channels
- details of the port facilities and strategic port land in the plant locality
- relationship to the GPC proposals for the development of the port
- water supply, power supply and telecommunications services.

2.2 Location

The regional and local context of the project should be described and illustrated on maps at suitable scales and reference points. Real property descriptions of the project site should be provided.

Maps or figures showing the position of features or boundaries should use the GDA94 datum. The GDA94 datum should also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals. Maps should show the indicative or proposed location of the project area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the project area is or will be subject to (including tenures for facilities in marine waters)
- the location and boundaries of the project footprints showing all key aspects, including indicative sites of gas plants, water treatment plants, pipelines, port, power stations, watercourses, water storages, buildings, roads, bridges, construction camps, etc.
- indicative sites of all proposed project transport infrastructure for inputs and outputs of the project

- 
- 
- the identification of all site access points to, from and within the project on maps, to assist in the assessment of emergency planning.

2.2.1 Regional context

The regional context of the proposed project should be described and illustrated on maps at suitable scales. A map should be included at an appropriate scale that identifies the entire project footprint including the gas transmission pipeline corridor and LNG facility. The maps should show the project in relation to:

- major infrastructure including road and rail networks
- physical features
- boundaries of the GSDA.

2.2.2 Local context

The location and boundaries for each component of the project should be illustrated and described in detail in the local context. Maps should show the precise location of the individual project areas, and in particular:

- the project component footprint
- the boundaries (existing and proposed) of petroleum pipeline licences and petroleum facility licences
- cadastral boundaries
- boundary of a state development area and local government area
- any mining and petroleum exploration leases in the vicinity of the component site
- features of national and state environmental significance
- existing and proposed infrastructure
- the location of proposed vegetation clearing, vegetation buffer areas and vegetation offset areas.

Consideration should be given to providing rectified air photo enlargements to illustrate components of the project in relation to the land and resource tenures and natural and built features of the area.

2.2.3 Route selection process for proposed transmission pipeline route

This section should describe the route selection process used to identify the proposed route and any feasible alternatives. It should describe the decision-making process that led to the nomination of the proposed route, and describe the proposed route in a travelogue format, listing key features encountered by the proposed route from start to end and key issues to be addressed in the impact assessment. Route selection should identify options for crossing Port Curtis and specify construction methods intended for the crossing, with a view to minimising impacts on watercourses, fish passage, riparian lands and marine ecosystems

Justification should be provided for selecting a route that traverses the conservation estate (e.g. national park, state forest, conservation park or nature refuge).

2.2.4 Gas transmission pipeline co-location opportunities

Where pipeline co-location is intended by Shell Australia, the EIS should outline how coordination or enhancement of impact mitigation strategies proposed for the gas pipeline corridor will be achieved. The potential implications of any infrastructure co-location on common user infrastructure right of way (ROW) width and alignment, construction techniques, and public safety should be described.

2.3 Construction

The extent and nature of the project's construction phase should be described including off-site works and services required for construction. Generally, matters to be described for each project component should include:

- the type and methods of construction, the construction equipment to be used and the items to be transported onto the construction sites
- general construction standards and site management procedures, including environmental and safety management
- site access:
 - provision of site access, power, telecommunications, water supply and other infrastructure
 - requirements for construction facilities
- construction requirements, including source and quantities of construction inputs and materials, and method of transport of construction materials
- extent of vegetation clearing required, including information on vegetation to be cleared that has significant conservation value (such as sensitive environmental areas and creek crossings), with a reference where in the EIS the impacts on such vegetation have been addressed
- an assessment of expected physical and chemical properties and quantities of soil/rock to be excavated
- details of any potential disruption to flows of waterways during construction and any diversion works required
- details of any potential disruption to groundwater flow and groundwater/surface water interaction during construction and any aquifer dewatering works required
- extent that service corridors will be used during construction and maintenance
- relocation of existing infrastructure
- timetable for construction, particularly noting seasonal weather considerations
- the hours of construction
- emergency aid/medical facilities to be provided on site
- the construction methods and containment/disposal of construction spoil
- the nature and volume of solid and liquid wastes, and their storage, handling and disposal
- disposal of plant-matter left after clearing vegetation
- disposal/reuse of surplus excavated material and if this material can be coordinated with concurrent construction activities in the vicinity

- cleanup and restoration (rehabilitation) of areas used during construction including any accommodation facilities and storage areas.

2.3.1 Feed gas transmission pipeline

The overall construction program for this project component, and the extent and nature of the construction of the feed gas transmission pipeline from Gladstone City Gate to the LNG plant should be described. The description should include the proposed type and methods of construction, including specialised methods for crossing waterways and road, rail, and other service corridors (including restoration works), the construction equipment to be used and the items to be transported onto the construction site.

Any staging of the project should be described and illustrated showing site boundaries, development sequencing and proposed timeframes. The estimated numbers of people to be employed in the construction phase should also be provided with a brief description of where those people may be accommodated and/or how they will be transported to the site.

Reference should be made to AS2885 and the *Australian Pipeline Industry Association Code of Environmental Practice*, which documents the approach that should be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction.


2.3.1.1 Pre-construction activities

A description of the pre-construction activities should be set out in this section, including any upgrading of existing infrastructure or construction of new infrastructure such as camps or dams. In addition, details should be provided from a whole-of-project perspective of the quantity of material required for ancillary construction activities and bedding materials for the pipeline from quarries, pits and extraction areas for sand and gravel. This section should also describe the proposed management of cleared trees (following removing of millable timber) in relation to waste management (i.e. vegetation – chipped or ground to assist in rehabilitation or soil stabilisation).

2.3.1.2 Feed gas transmission pipeline parameters

This section should provide a detailed description of the proposed feed gas transmission pipeline including ancillary infrastructure. The pipeline should be described with reference to the following:

- maps of the preferred route location
- potential location and/or frequency of cathodic protection points, compressor stations, block valves (isolation points), including a description and layout of proposed facilities
- expected pipeline design and installation specifications (e.g. pipe grade, design life, wall thickness, depth of cover, and other information as deemed relevant)
- criteria for design and location of any temporary or permanent access crossings
- corridor widths and access requirements along the route, including the long-term cleared corridor width as well as the width required for construction and location of new corridor access tracks. Corridor widths should be designed to



minimise impacts on natural resources including potential loss of vegetation and Good Quality Agricultural Land (GQAL)

- where the pipeline is located in a common user corridor, how construction will be managed given the potential proximity of other high pressure gas pipelines
- pipeline pressure testing activities and the treatment and disposal of test water
- proposed locations of temporary and permanent above-ground infrastructure
- locations of existing infrastructure that might be affected by construction and operation of the pipeline.

2.3.1.3 Feed gas transmission pipeline coastal/marine works

The extent and nature of the project's feed gas transmission pipeline marine crossing coastal and marine areas should include:

- discussion of the coordination of works with other pipeline crossing proponents
- the type and methods of construction for the coastal/marine works, including pipe unloading methodology and proposed landing sites
- details of any temporary marine infrastructure (including dredging requirements)
- the equipment to be used for the construction of the above and the method of construction
- the launching area for marine equipment
- the volume of materials to be transported to the site
- the items to be transported to the site for construction
- the expected length of the offshore construction phase, and staging of the project.

The methods proposed for the dredging associated with the pipeline crossing should be described and should include:

- the type and method of dredging proposed
- the dredge equipment, including any marine flora and fauna protection measures proposed
- the expected timing of the dredging
- the amount of dredged material to be disposed of
- plans showing the location of dredging areas and disposal areas.

The disposal of dredged material should be described including:

- the characteristics of the spoil disposal area(s)
- the physical and chemical qualities of the dredged material (in accordance with the *National Ocean Disposal Guidelines for Dredged Material, 2002*)
- management of the dredged material disposal area(s) during disposal operations.

2.3.2 LNG plant and terminal facilities

The extent and nature of the construction of the LNG facility should be described. The description should include the type and methods of construction, the construction equipment to be used and the items to be transported onto the construction site. Any staging of the project should be described and illustrated showing site boundaries, development sequencing and timeframes.

The estimated numbers of people to be employed in the construction phase (including a labour histogram) should also be provided, with a brief description of where those people may be accommodated and/or how they will be transported to the site.

2.3.2.1 On-shore construction

The description of the extent and nature of the LNG plant's on-shore construction phase should include:

- type and methods of construction
- the equipment to be used for plant construction
- details on the movement of people, equipment and materials by sea and land
- the items of plant, materials and equipment to be transported to the site for construction, including delivery methods, storage areas, and quarantine requirements
- nature and extent of surface earthworks and drainage structures
- the expected length of the on-shore construction phase, and staging of the proposal, with illustration/s showing site boundaries, development sequencing and timeframes.

2.3.2.2 Coastal/marine construction

The extent and nature of the LNG plant's coastal and marine construction phase and components should be described. For each component that includes off-shore activities (e.g. LNG facility jetty/wharf, berthing basin, construction dock) the description should include:

- the type and methods of construction for the coastal/marine works, including module unloading methodology and proposed landing sites
- details of any temporary marine infrastructure such as buoys and beacons (including dredging requirements)
- the equipment to be used for the construction of the marine facilities and the method of construction
- the launching area for marine equipment
- the nature and volume of plant and materials to be transported to the site
- the expected length of the off-shore construction phase, and staging of the project.

Drawings indicating the type, location and extent of the tidal works proposed (e.g. areas to be dredged, the jetty and wharf structures, and any works proposed to be attached to the jetty and wharf) are required.

2.3.2.3 Dredging and dredged material disposal

Where not included or addressed in the Western Basin Strategic Dredging and Disposal Project, the methods proposed for the dredging associated with the establishment of the construction dock, and the berth pocket associated with the jetty and wharf should be described and should include:

- the type and method of dredging proposed and alternative methods of spoil disposal
- the dredge equipment, including any marine flora and fauna protection measures proposed
- the expected timing of the dredging
- the amount of dredged material to be disposed of
- plans showing the location of dredging areas and disposal areas.

The disposal of dredged material should be described including:

- the characteristics of the spoil disposal area(s)
- the physical and chemical qualities of the dredged material (in accordance with the *National Assessment Guidelines for Dredging (DEWHA, 2009)*)
- management of the dredged material disposal area(s) during disposal operations.

2.4 Operations

This section should describe the transmission pipeline and LNG facility operation and maintenance activities.

Generally, the description should include, but not be limited to:

- a description of plant and equipment to be employed
- chemicals to be used
- the progressive increase and expected project capacity
- transport requirements (road, rail and shipping)
- maintenance dredging and dredge material disposal
- hours of operation
- the estimated number of people to be employed
- security requirements.

2.4.1 Feed gas transmission pipeline

The EIS should describe the pipeline monitoring systems such as electronic surveillance systems (including cathodic protection), helicopter and ground patrols.

The measures used to monitor and measure rehabilitation success should be discussed, and proposed ROW remediation activities described for areas where initial rehabilitation activities are not successful.

Emergency and safety measures in place to manage a rupture in the integrity of the pipeline should be described.

2.4.2 LNG plant and terminal facilities

2.4.2.1 LNG plant

The discussion of plant components should include the following:

- inlet feed gas metering
- gas treating facilities (removal of impurities)
- liquefaction (refrigeration)
- product storage
- product loading
- plant infrastructure and utilities (including desalinisation plant).

Concept and layout plans should be provided highlighting proposed buildings, structures, plant and equipment. The nature, sources, location and quantities of materials to be handled, including the storage of raw materials, should be described. Indicative process flow-sheets should be provided showing material balances for the LNG plant, and the anticipated rates of inputs, along with similar data on products, wastes, emissions, and recycle streams.

The process for the liquefaction of CSG should be described and should address CO₂ removal, water removal, liquefaction and nitrogen removal.

The proposed methods and facilities to be used for LPG and LNG storage and transfer of product should be described and shown on plans at an appropriate scale.

This section should include a discussion of any environmental design features of these facilities, including bunding of storage facilities, collection and recycling of product boil-off. The frequency and management of planned and unplanned unit/plant shutdown events, and the management of desalinisation plant wastes should be discussed.

2.4.2.2 Terminal facilities

The Shell Australia shipping terminal is likely to consist of wharfs, jetties, gas loading equipment, and an adjacent berthing basin. The long-term operation of the terminal should be described and include:

- a description of the operations of the terminal
- gas loading facility and ship capacities and dimensions
- the expected shipping frequency
- tug support operations
- refuelling arrangements
- expected ship access, navigational and anchorage arrangements
- maintenance dredging operations
- environmental management measures incorporated in the operation of the LNG terminal.

The facilities to be used for loading product to ship should be shown on plans at an appropriate scale.



2.5 Associated infrastructure

This section should detail requirements for new infrastructure or the upgrading/relocating of existing infrastructure to service the project. Matters to be considered (where applicable) include workforce accommodation, transportation, water supply, energy supply, telecommunications, stormwater and sewerage.

2.5.1 Workforce and accommodation

This section should outline the project's workforce numbers and accommodation strategy for the workforce in each location. It should describe the number of personnel and their dependants to be accommodated at each of the project component localities for all project stages, and should outline the numbers and type of accommodation required. The locations and size of all accommodation requirements for both temporary and permanent accommodation should be described for both the construction and operational phases of the project.

Given that other major projects are planned to be constructed within a similar timeframe to the project, the project's accommodation proposals should demonstrate that they will provide sufficient housing to not impact upon the current scarce accommodation resources in the region. These proposals should also outline re-use options for accommodation facilities and how such facilities may benefit the respective communities.

This section should also identify the location and size of temporary construction workforce accommodation to be provided at any and all of the project sites. The layout of typical construction camps and a description of facilities should be provided. All statutory approvals required for establishment and operation of such camps should be outlined.

Further details of workforce skills base along with workforce recruitment and accommodation impacts should be addressed in section 4.1.

2.5.2 Transport


This sub-section should describe arrangements for the transport of plant, equipment, construction material, products, wastes and personnel during both the construction phase and operational phases of the project.

The description should address the use of existing local and regional facilities and requirements for the construction, upgrading or relocation of any transport related infrastructure (e.g. road, airstrips, barge and ferry facilities etc.). Full details of expected transport volumes, modes and routes should be provided in section 3.9.

The expected mode and frequency of travel for workers to and from the work site should be provided, and the journey to work road routes identified. Where road upgrades are required to accommodate the additional volume of traffic, these should be described.

2.5.3 Water supply and storage

The EIS should provide information on expected water usage by the project, including the quality and quantity of all water supplied to project sites. In particular, the proposed and optional sources of water supply should be described (e.g. artesian and non-artesian bores, any surface storage, municipal water supply pipelines). Estimated rates of supply from each source (average and maximum rates) should be given. Any proposed water conservation and management measures should be described.



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

Specific details should be presented of the LNG plant's water needs. The discussion should detail proposed water sources (e.g. seawater desalination) and further treatment required to meet specific needs, such as for process water, potable water and demineralised water. A water balance for the LNG site should be provided. Opportunities for water re-use should be identified.

2.5.4 Stormwater drainage

A description should be provided of the proposed stormwater drainage system and the proposed disposal and/or re-use arrangements. Each element of the project needs to be addressed. Further details should be provided in section 3.4.

2.5.5 Sewerage

This section should describe, in general terms, the sewerage infrastructure required to service each project component. Volume estimates of existing and likely industrial and domestic effluent that will be produced should be outlined and the proposed method of disposal identified. This should include the expected physical and chemical characteristics of such effluent. Further details should be provided in section 3.8.

2.5.6 Energy

The EIS should describe all external energy requirements, including electricity, LPG, and/or solid and liquid fuel requirements for the construction and operation of the project. The locations of any power easements should be shown on an appropriate plan.

Energy conservation measures forming part of the project's design or operating procedures should be briefly described in the context of any Australian, state and local government policies.

2.5.7 Telecommunications

The EIS should describe the telecommunications proposed for the project and any impacts on existing telecommunications infrastructure (such as optical cables, microwave towers, etc). Infrastructure owners need to be identified. As telecommunication devices may affect some aids to navigation infrastructure and/or services, the proponent should liaise with the Regional Harbour Master (Gladstone).

2.6 Decommissioning and rehabilitation

2.6.1 Gas transmission pipeline

Details should be provided on how the pipeline and ancillary equipment, including buildings and structures, would be removed or made safe if left in-situ.

2.6.2 LNG plant and terminal facilities

The means of decommissioning the LNG facility, both from the construction and operational phases, in terms of the removal or making safe of plant, equipment, structures and buildings should be described, and the methods proposed for the rehabilitation of the affected areas should be given. Final rehabilitation of the site should be discussed in terms of ongoing land use suitability, management of any residual contaminated land and any other land management issues.

3 Environmental values and 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 to the environmental values should be described.
- describe any cumulative impacts on the environmental values caused by the project in combination with other known existing or planned sources of impact.
- present objectives, standards and measurable indicators that protect the identified environmental values.
- describe the control strategies, proposed actions and technologies to be implemented for managing impacts to achieve the stated objectives and standards. Where relevant, alternative techniques to control and manage impacts should be discussed.
- describe any residual environmental impacts and why they cannot be avoided. Discuss potential offsets in accordance with Queensland Government specific-issue offsets policies.

This section should detail the environmental protection measures incorporated in the planning, construction, operations, decommissioning, rehabilitation and associated works for each component of the project. Measures should prevent, or where prevention is not possible, minimise environmental harm and maximise socio-economic and environmental benefits of the project. 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, freshwater, marine waters, 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 herein. The mitigation measures, monitoring programs etc., identified in this section of the EIS should be used to develop the EM Plan for the project (see section 9).



3.1 Climate and climate change adaptation

3.1.1 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. Historic weather patterns in the project area and seasonal conditions (e.g. cyclones, thunderstorms, floods and storms) that may influence timing and/or construction methods should be discussed, including how this would be managed. Extremes of climate (e.g. droughts, floods, etc) should be discussed with particular reference to water management at the project site.

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) should be addressed in section 3.4 with regard to contamination of waterways and in section 3.8 with regard to the design of the waste containment systems. The impacts of winds, rain, humidity and temperature inversions on air quality should be addressed in section 3.6.

3.1.2 Climate change adaptation

Climate change, through alterations to weather patterns and rising sea level, has the potential to impact in the future on developments designed now. Consequently, the EIS should provide an assessment of the project's vulnerabilities to climate change and describe possible adaptation strategies for the activity including:

- a risk assessment of how changing patterns of rainfall and hydrology, temperature, extreme weather and sea level (where appropriate) may affect the viability and environmental management of the project
- the preferred and alternative adaptation strategies to be implemented; and
- commitments to undertake any existing or proposed government and/or petroleum industry programs on climate change.

It is recognised that predictions of climate change and its effects have inherent uncertainties, and that a balance must be found between the costs of preparing for climate change and the uncertainty of outcomes. However, the proponent should incorporate a strategy for adaptation to climate change in their EIS and project design where possible.

3.2 Land

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

Schedules of disturbance should be described and discussed for all aspects of the project in accordance with the DERM guideline *Financial assurance for petroleum activities*. Information should be provided demonstrating that the financial assurance estimates will be adequate for worst-case scenarios (including maximum possible areas of disturbance, maximum proportion of problem soil areas and maximum proportion of environmentally sensitive areas).



3.2.1 Topography, geomorphology and geology

3.2.1.1 Description of environmental values

Topographical maps should be provided locating the project in both regional and local contexts using the Geocentric Datum of Australia (GDA94). The topography of the project sites 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 EIS should provide a description, map and a series of cross-sections of the geology of the project area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance.

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 any mineral resources that may be impacted or sterilised by the project.

3.2.1.2 Potential impacts and mitigation measures

This section of the EIS should provide information on potential impacts to the land resources, and proposed mitigation and management methods. In particular information should be provided on:

- the need for rock, sand and gravel for construction materials, including any new or expanded quarry and screening operations required to service the project
- the environmental consequences of the excavation and removal of materials and soils from any borrow pits.

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


3.2.2 Soils

3.2.2.1 Description of environmental values

A soil survey of the areas to be disturbed by the project should be conducted at a suitable scale, with particular reference to the physical and chemical properties of the materials that influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land. Information should also be provided on soil stability, suitability for construction of proposed facilities and any approved soil conservation plans. An appraisal of the depth and quality of useable soil should be undertaken.

Soil profiles should be mapped at a suitable scale and described according to the *Australian Soil and Land Survey Field Handbook* (McDonald et al, 2009) and *Australian Soil Classification* (Isbell, 2002). 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* (DME, 1995).

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). These guidelines recommend



that disturbed areas be mapped more intensively than non-disturbed areas and provide guidance on acceptable mapping scale and site intensity.

Acid sulfate soil (ASS) investigations are required to meet *State Planning Policy 2/02, Planning and Managing Development involving ASS* where the proposed development would trigger one of the criterion listed in section 2.3 of that policy. All investigations should be conducted in accordance with the SPP2/02 guideline and the guidelines for *Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998*. Where disturbance to ASS is unavoidable, an ASS Management Plan should be prepared in accordance with the *Queensland Acid Sulfate Soil Technical Manual—Soil Management Guidelines*.

3.2.2.2 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
- dams, banks and creek crossings
- gas pipeline corridor
- the LNG plant area and surrounding buildings
- access roads or other transport corridors
- areas under rehabilitation.

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.

3.2.3 Land use and tenure

3.2.3.1 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, railways, and stock routes)
- land use (urban, residential, industrial, agricultural, GQAL, forestry, recreational, mining exploration tenures, mining leases, mining claims, mineral development licences, extractive industry permits, petroleum authorities, state development areas)
- areas covered by applications for native title determination, with a description of Native Title Representative Bodies (NTRB) boundaries
- information on any known occurrences of economic mineralisation and extractive resources, petroleum and gas deposits within the project area and the potential impact of the project on these operations and associated tenements (e.g. Stuart Shale Oil)
- location of gas and major water pipelines, power lines, telecommunication cables, roads, railways, bridges, airports, airstrips, helipads and any other infrastructure



- the distance of the project component from residential and recreational facilities, or other potentially non-compatible land uses
- port uses need to be placed into context of the *GPC Land Use Plan (1995)*, and any subsequent version
- recreational and commercial fishing activities and values undertaken in proximity to the site and offshore area should be described
- location of existing dwellings and the zoning of all affected lands according to any existing town or strategic plan, planning schemes, port land use plan and State Development Area development scheme .

In particular, the EIS should indicate if the land affected by the proposal is, or is likely, to become part of the protected area estate, or is subject to any treaty. The following should be identified and mapped - national parks, marine parks (State and Commonwealth), conservation parks, nature refuges (conservation agreements) declared fish habitat areas, wilderness areas, areas of state significance (scenic coastal landscapes), areas of state significance (natural resources), coastal wetlands, aquatic reserves, heritage/historic areas or items, national estates, world heritage listings and sites covered by international treaties or agreements (e.g. Ramsar, JAMBA, CAMBA), areas of cultural significance and scientific reserves.

MNES under the Commonwealth's EPBC Act should be described in section 8 and mapped where possible.

3.2.3.2 Potential impacts and mitigation measures

The potential for the construction and operation of the project to change existing land uses of the project sites and adjacent areas should be detailed. Consideration should be given to impacts arising from property disruption and severance, construction and maintenance.

The potential environmental harm to adjacent areas currently used for agriculture, urban development, recreation, tourism or other business, and the constraints on land uses should be described. Incompatible land uses (existing and proposed) should be identified and measures to avoid unacceptable impacts defined.

In particular, the discussion should:

- assess the compatibility of the proposal with surrounding land uses (e.g. mining, residences, agriculture)
- describe possible impacts on surrounding land uses and human activities, including impacts to tidal lands (addressing loss of access to land and waterways and tidal lands)
- describe fragmentation of sites, increase of fire risk and impacts on residential and industrial uses
- describe strategy and progress in relation to making of native title agreements, including NTRBs, consultant selection, traditional owner involvement and related statutory processes
- outline the potential issues involved in proximity of the project to electric power transmission lines and electrified rail lines, both at crossing points, where lines run parallel, and where construction and maintenance machinery is used in the vicinity of other infrastructure corridors
- identify if millable timber or quarry resources exist on the pipeline route and LNG plant site and conduct an assessment of the commercial value of these resources.



3.2.4 Landscape character and visual amenity

3.2.4.1 Description of environmental values

This section should describe the existing character of the landscape that will be affected by the project. Information should be presented in the form of maps, sections, elevations and photographs, and should include:

- image and townscape objectives identified in any town planning scheme or strategic plan relevant to the project area
- major views, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area
- focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use
- identification of the areas that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character
- the value of existing vegetation as a visual screen.

3.2.4.2 Potential impacts and mitigation measures

The potential impacts of the project upon the 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. Measures to be undertaken to mitigate or avoid the identified impacts should be detailed and illustrated.

This section should analyse and discuss the visual impact of the project on particular panoramas and outlooks, when viewed from public places.

The assessment is to address the visual impacts of the project structures and associated infrastructure, using appropriate simulation. Sketches, diagrams, computer imaging and photos are to be used where possible to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations.

Special consideration is to be given to public roads, public thoroughfares, and places of residence or work, which are within the line-of-sight of the project.

The design and colour of any major structures, buildings and all proposed visual screens should be described, and their role in the minimisation of the visual impacts of the project should be outlined.

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.



An assessment should be undertaken of potential impacts of light sources within the project site and its immediate surroundings. Of particular interest would be:

- visual aspect at night in relation to the location of the project in rural settings
- impacts of the lighting of the LNG facilities on navigation of vessels in Gladstone harbour
- potential impact of increased vehicular and rail movements at night
- proximity of light sources to significant receptor areas such as fauna habitats, residential and business establishments.

3.2.5 Land contamination

3.2.5.1 Description of environmental values

This section should discuss known land contamination within the project areas by existing and past uses, and identify the nature and concentration of any contaminants.

This discussion should identify land used for a notifiable activity as listed in Schedule 2 of the EP Act, and land which is listed on the *Queensland Environmental Management Register* or the *Queensland Contaminated Land Register*.

A preliminary site investigation (PSI) of the project sites consistent with the EPA's *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* should be undertaken to determine background contamination levels. The results of the PSI should be summarised in the EIS and provided in detail in an appendix.

If the results of the PSI indicate potential or actual contamination, a detailed site investigation progressively managed in accordance with the stages outlined in Appendix 5 of the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* should be undertaken.

The following information should be provided in the EIS:

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

The EIS should address management of any existing or potentially contaminated land in addition to preventing and managing land contamination resulting from project activities. Proponents should consult with the Contaminated Land Section of DERM regarding study proposals.

3.2.5.2 Potential impacts and mitigation measures

The EIS should describe the possible contamination of land resulting from project actions including spillage, waste, acid generation from exposed sulphuric material, spills at chemical and fuel storage areas, and storage/spillage of associated water or waste from treated water at the CSG fields.

The means of preventing land contamination (within the meaning of the EP Act) should be addressed and the strategies and methods proposed for preventing, recording, containing and remediating any contaminated land outlined.

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.

3.2.6 Land disturbance

3.2.6.1 Potential impacts and mitigation measures

The EIS should contain strategies aimed at minimising the amount of land disturbed at any one time. The strategic approach to progressive rehabilitation should be described. The consistency of the approach with relevant guidelines should be provided.

The methods to be used for the project, including backfilling, covering, re-contouring, topsoil handling and revegetation, should be described. Consideration should be given to the use of threatened plant species during any landscaping and revegetation.

Any proposals to divert creeks during construction and their reinstatement should be outlined

A description of topsoil management should consider transport, storage and replacement of topsoil to disturbed areas. The topsoil management should also outline how GQAL soils will be utilised. The minimisation of topsoil storage times (to reduce fertility degradation) should also be addressed. Erosion and sediment control measures should be described, particularly in relation to the management of sodic and saline materials.

3.3 Nature conservation

This section should describe the existing environmental values for nature conservation that may be affected by the project in terms of:

- integrity of ecological processes, including habitats of least concern (common), near threatened, rare, vulnerable and endangered species and ecological communities
- conservation of resources
- biological diversity, including habitats of rare and threatened species
- integrity of landscapes and places including wilderness and similar natural places
- aquatic, terrestrial and marine ecosystems.

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

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

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

3.3.1 Sensitive environmental areas

3.3.1.1 Description of environmental values

The EIS should identify areas that are environmentally sensitive in proximity to the project. Environmentally sensitive areas should also include areas classified as having international, national, state, regional or local biodiversity significance, or flagged as important for their integrated biodiversity values. Consideration should be given to national parks, conservation parks, declared fish habitat areas, wilderness areas, aquatic reserves, nature refuges, heritage/historic areas or items relating to biodiversity, national estates, world heritage listings



and sites covered by international treaties or agreements (e.g. Ramsar, Japan-Australia Migratory Bird Agreement, China-Australia Migratory Bird Agreement, Republic of Korea-Australia Migratory Bird Agreement), areas of cultural significance relating to biodiversity and scientific reserves.

DERM has produced a number of Biodiversity Planning Assessments that determine the biodiversity significance of terrestrial locations including areas within the footprint of, and in proximity to, the project. These should also be utilised during identification of sensitive environmental areas and the identified used values considered.

MNES identified above are to be discussed in section 8.

The proximity of the project to any environmentally sensitive areas should be shown on a map of suitable scale. As well as the above characteristics, areas that would be regarded as sensitive with respect to flora and fauna have one or more of the following features:

- important habitats of species listed under the *Nature Conservation Act 1992* and/or the EPBC Act as 'presumed extinct', 'critically endangered', 'endangered', 'vulnerable' or 'rare'
- regional ecosystems recognised by the EPA as 'endangered' or 'of concern' or 'not of concern' but where permits are no longer granted due to being at threshold levels, and/or ecosystems listed as 'presumed extinct', 'critically endangered', 'endangered' or 'vulnerable' under the EPBC Act
- ecosystems that provide important ecological functions, such as riparian vegetation, important buffer to a protected area, refuge or important habitat corridor between areas
- protected areas which have been proclaimed under the *Nature Conservation Act 1992* or are under consideration for proclamation.

3.3.1.2 Potential impacts and mitigation measures

This section should discuss the following:

- the impact of the project on species, communities and habitats of local, regional, national or international significance
- proposals to mitigate impacts (e.g. timing of works, minimise width of disturbance, proposed rehabilitation of in-stream and floodplain disturbances)
- planned rehabilitation of vegetation communities and any relevant previous experience/experiments rehabilitating these communities
- offsets relating to residual impacts with regard to the *Queensland Government Environmental Offsets Policy (QGEOP) 2008* as well as the draft policy statement on the use of environmental offsets under the EPBC Act. The Queensland Government offsets policy provides for specific-issue offset policies, as follows:
 - *Policy for Vegetation Management Offsets* (NRW, 2007)
 - *Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss* (DPI&F, 2002)
 - *draft Policy for Biodiversity Offsets* (consultation draft, EPA, 2008)

Any departure from no net loss of ecological values should be described.

Potential impacts and associated mitigation measures should be discussed further under section 3.3.2 Terrestrial flora, and section 3.4 Water resources.



3.3.2 Terrestrial flora

3.3.2.1 Description of environmental values

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

- location and extent of vegetation types including recognised regional ecosystem type descriptions and any areas of national, state or regional significance
- location of vegetation types of conservation significance
- vegetation map unit descriptions, including their relationship to regional ecosystems. Sensitive or important vegetation types should be highlighted and their value as habitat for fauna and conservation of specific rare floral and faunal assemblages or community types discussed
- the current extent (bioregional and catchment) of protected vegetation types of conservation significance within protected areas (e.g. national parks, conservation parks, resource reserves, nature refuges)
- any plant communities of cultural, commercial or recreational significance
- the distribution and abundance of significant exotic and weed species.

The description should contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests. The assessment should also include a description of vegetation (including re-growth and restored areas in addition to remnant vegetation) to indicate any areas of state, regional or local significance.

The description should also include, where relevant, MNES identified within the EPBC Act. MNES identified above should be fully discussed in section 8.

For each significant natural vegetation community likely to be impacted by the project, vegetation surveys should be undertaken at an appropriate number of sites, allowing for seasonal factors, as follows:

- all data should be collected in accordance with the requirements of 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 list of species present at each site should be recorded
- the relative abundance and community structure 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
- 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 existence of rare or threatened species should be specifically addressed under sensitive areas. Any special landscape values of natural vegetation communities should be described.



Existing information on plant species may be used instead of new survey work provided that the data are derived from surveys consistent with the above methodology and describe existing conditions. Methodology used for flora surveys should be specified in the appendices to the report. 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.

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.

The use of Biosecurity Queensland's Annual Pest Distribution Survey data and predictive pest maps available on the DEEDI website should be utilised in conjunction with Queensland Herbarium naturalised flora data to source the occurrence of pest plants in the project area.

3.3.2.2 Potential impacts and mitigation measures


This section should discuss all foreseen direct and indirect effects on terrestrial flora and the potential level of environmental impact identified. Action plans for protecting rare or threatened species and vegetation types identified as having high conservation value should be described and any obligations imposed by Queensland or Australian government biodiversity protection legislation or policy should be discussed.

Project construction and operational activities involving clearing, salvaging or removal of vegetation should be described, and indirect impacts on vegetation not cleared should be assessed.

The number of hectares of remnant vegetation proposed to be cleared (by conservation status and regional ecosystem type) for each project component should be identified. The proposed clearing should examine the effects of the proposed clearing on the long-term sustainability of these ecosystems at a regional level. This should also include the identification of potential offset areas consistent with Queensland offsets and the draft EPBC offsets policy to compensate for any loss of vegetation.

With regard to the project areas, this section should include:

- the significance of impacts at a local, catchment, bioregional, state, national or international level
- impact on any plants of potential or recognised environmental or economic significance
- a discussion of the ability of identified stands of vegetation to withstand any increased pressure resulting from the project and measures proposed to mitigate impacts
- a description of the methods proposed to ensure rapid rehabilitation of disturbed areas. This description should include the species chosen for revegetation which should be consistent with the surrounding vegetation associations. Details of any post construction monitoring programs and the benchmarks to be used for review of monitoring results should be included. Consideration should be given to the establishment of reference sites (at least two for each ecosystem type being rehabilitated) to provide benchmarking for rehabilitation activities
- a discussion on the potential for the introduction and/or spread of weeds or plant disease, including:
 - identification of the origin of construction materials, machinery and equipment
 - vehicle inspection regime, which addresses the need for vehicle and machinery wash-down and any other hygiene protocols, including the requirement that all vehicles and



equipment must be cleaned before starting the job and that these wash down areas contain water/soil away from creeks and gullies

- staff/operator education programs
- determination of the potential for the introduction of, or facilitation of, exotic, non-indigenous and noxious plants
- a draft weed management plan in an EM Plan format. This plan should be developed and finalised in consultation with Biosecurity Officers from DEEDI land and local government environmental officers, to cover construction, rehabilitation and operation periods
- weed management strategies are required for managing weed species already present at the project site and ensuring no new declared plants are introduced to the area. Reference should be made to the local government authority's pest management plan when determining control strategies. The strategies for managing weeds should be discussed in the main body of the EIS and provided in a working form in a Pest Management Plan as part of the overall EM plan for the project.
- a biosecurity management plan for biosecurity mitigation measures where the project accesses primary production areas (plant communities of commercial significance).

The above assessment should include, where relevant, MNES identified under the EPBC Act. MNES identified above are to be discussed in section 8.

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. Wildlife corridors and refuges should be identified and mapped.

The description of the fauna present or likely to be present in the area should include:

- species diversity (i.e. a species list) and indicative abundance of animals, including amphibians, birds, reptiles, and mammals (including bats)
- any species that are poorly known but suspected of being rare or potentially threatened
- habitat requirements and sensitivity to changes, including movement corridors and barriers to movement
- existence of any rare, threatened or otherwise noteworthy species/communities in the project areas, including a discussion of the range, habitat, breeding, recruitment, feeding and movement requirements, and the current level of protection (e.g. any requirements of protected area management plans)
- use of the area by migratory and nomadic birds, in particular areas for breeding or significant congregations
- the existence of feral or exotic animals, including maps of major pest infestations.

The EIS should contain results from surveys for species listed as threatened or migratory under the EPBC Act. Surveys should be conducted at the appropriate time of the year when the species is known to be present on the site, so that identification and location of these species is optimal. MNES identified here are to be discussed in section 8.

The methodology used for fauna surveys should be specified in the appendices to the report. The EIS should indicate how well any affected significant communities and species are represented and protected elsewhere in the region where the project occurs. Relevant site data



should be provided to the DERM in a format compatible with the DERM *WildNet* database for listed threatened species.

The use of Biosecurity Queensland's Annual Pest Distribution Survey data and predictive pest maps available on the DEEDI website, together with local government area pest management plans, should be utilised to source the occurrence of pest animals in the project area.

3.3.3.2 Potential impacts and mitigation measures

This section should discuss all foreseen direct and indirect effects on terrestrial fauna. Strategies for protecting rare or threatened species should be described and any obligations imposed by Queensland threatened species legislation or policy should be discussed. Australian Government threatened species legislation should be discussed in section 8.

Any recovery plans for potentially affected threatened species should be outlined, and strategies for complying with the objectives and management practices of relevant recovery plans should be described. Measures to mitigate the impact on habitat or the inhibition of normal movement, breeding or feeding patterns, and change to food chains should be described. Any provision for buffer zones and movement corridors, or special provisions for migratory or nomadic animals should be discussed.

With regard to terrestrial and riparian fauna, the assessment of potential impacts should consider:

- impacts the project may have on terrestrial fauna, relevant wildlife habitat and other fauna conservation values, including:
 - direct and indirect impacts due to loss of range/habitat, food supply, nest sites, breeding/recruiting potential or movement corridors
 - impacts on rare and threatened or otherwise noteworthy animal species
 - identification of the conservation importance of identified populations at the regional, state and national levels
 - cumulative effects of direct and indirect impacts
- measures to minimise wildlife capture and mortality during construction and operation
- details of the methodologies that would be used to avoid injuries to livestock and native fauna as a result of the project's construction and operational works and if accidental injuries should occur, the methodologies to assess and handle the injuries
- methods for minimising the introduction of feral animals, and other exotic fauna such as declared pest ant species (fire ants and yellow crazy ants)
- a review of control measures to prevent increases in local populations and spread of biting insect species of pest and health significance associated with construction and operational activities and disposal of construction and operational wastes.
- a pest animal management plan in an EM Plan format. This plan should be developed and finalised in consultation with Biosecurity Officers from DEEDI and local government environmental officers, to cover construction, rehabilitation and operation periods
- a biosecurity management plan for biosecurity mitigation measures where the project accesses primary production areas.

These would also include, where relevant, MNES identified under the EPBC Act. The MNES are to be discussed in section 8.



3.3.4 Freshwater aquatic flora and fauna

3.3.4.1 Description of environmental values

The aquatic flora and fauna occurring in the areas 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 provided. The discussion of the fauna and flora present or likely to be present in the area should include:

- fish species, mammals, reptiles, amphibians and aquatic invertebrates occurring in the waterways within the project area, including any feral and exotic fauna species
- aquatic (waterway) macrophytes including native and exotic/weed species
- wetlands listed by DERM as areas of national, state or regional significance, and their values and importance
- a description of terrestrial species that are ecologically associated with wetlands or waterways and are likely to be affected by the project
- aquatic habitats, substrates and stream types.
- Description of mitigation measures to minimise aquatic habitat modification and associated impacts on aquatic flora and fauna.

These would also include, where relevant, MNES identified under the EPBC Act. The MNES are to be discussed in section 8.

3.3.4.2 Potential impacts and mitigation measures

This section should discuss all foreseen direct and indirect effects on aquatic flora and fauna, including strategies for protecting rare or threatened species and any obligations, legislation or policies imposed by the Queensland and Australian governments. The discussion should include:

- measures to minimise wildlife injury and mortality during construction and operation
- details of the methodologies that would be used to avoid injuries to native fauna as a result of the project's construction and operational works, and if accidental injuries should occur the methodologies to assess and handle injuries
- details of measures to be used to maintain fish passage in creeks that would be affected
- potential impacts on groundwater dependant ecosystems, with options to avoid or mitigate these impacts, and details of proposed monitoring for each identified groundwater dependant ecosystems
- review of control measures to prevent increases in local populations and spread of biting insect species of pest and health significance associated with construction activities and disposal of construction wastes
- description of mitigation measures to prevent the creation of new mosquito and biting midge breeding sites, particularly during construction
- description of 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.



3.3.5 Marine flora and fauna

3.3.5.1 Description of environmental values

Marine flora and fauna occurring in the areas affected by the proposal should be described noting the patterns and distribution in Port Curtis. The description of the fauna and flora present in the areas should include:

- fish species, mammals, reptiles and crustaceans occurring in marine waters, including pest species
- marine plants, including seagrass, saltmarsh and mangroves
- benthic, rocky shore and reefal habitats
- habitat for commercial and recreational fisheries
- particular reference habitat of any rare or threatened species
- proximity to declared Fish Habitat Areas
- presence of marine mammals and marine turtle foraging areas and nesting areas in the vicinity of the proposed port
- sea floor habitat and benthic macro invertebrate communities in the vicinity of the spoil ground
- where relevant, MNES identified under the EPBC Act.

3.3.5.2 Potential impacts and mitigation measures

The potential impacts of the project on benthic habitat and marine fauna and flora, including sea grass beds, marine plants, other fish habitats and other rare or threatened species should be assessed. The EIS should also discuss the potential for damage to these ecosystems (including dependent faunal species). Mitigation methods to reduce impacts on identified environmental values should be outlined. Restoration of the disturbed area (especially where marine plants have been removed) should also be outlined.

Vectors for an introduction of a marine pest, possible impacts of a marine pest incursion and proposed mitigation measures should be discussed together with on-going monitoring for marine pests in the port and proposed response arrangements if a marine pest incursion occurs.

Assessments should include, where relevant, MNES identified under the EPBC Act. The MNES are to be discussed in section 8.



3.4 Water resources

The definition of waters in the Environmental Protection (Water) Policy 1997 (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 describe the amount of water to be taken and the details of the works to be constructed, and impacts of the works.

3.4.1 Surface water and watercourses

3.4.1.1 Description of environmental values

The EIS should describe the environmental values of the surface waterways of the affected area in terms of:

- values identified in the EPP (Water) and Australian and New Zealand Environment and Conservation Council, *State of the Environment Reporting Taskforce 2000* (ANZECC 2000)
- 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, declared or proposed wild river areas relevant to the affected catchment.

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 existing and historical flow regimes in major streams and wetlands and a description of present and potential water uses downstream of the areas affected by the project.

Details should be provided on the likelihood of flooding, history of flooding (including extent, levels and frequency). Flood studies should include a range of annual exceedance probabilities for affected waterways, based on observed data if available, or use appropriate modelling techniques and conservative assumptions if there are no suitable observations. The flood modelling should include local flooding due to short duration events from contributing catchments on site, as well as larger scale regional flooding including waterways downstream.

The EIS should provide a description, with photographic evidence where appropriate, of the geomorphic condition of any watercourses likely to be affected by project works and operations. The results of this description should form the basis for the planning and subsequent monitoring of rehabilitation of the affected watercourses.

An assessment is required of existing water quality in surface waters and wetlands likely to be affected by the proposal. The basis for this assessment should be a monitoring program, with sampling stations located upstream and downstream of the project areas. The water quality monitoring should capture seasonal variations or variations with flow where applicable. A relevant range of physical, chemical and biological parameters should be measured to provide a baseline for affected creek or wetland systems.



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. An analysis of potential impacts on affected creeks should be carried out. This analysis should identify any likely inundation and duration, as this may affect emergency vehicle access.

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 changed flow regimes in affected water courses.

Where on-site storage of water sourced from waste water treatment plants is proposed, the EIS should detail how this water would be managed to ensure environmental harm and human health risk is avoided. The EIS should also describe the design features of any such storages to effectively contain saline water and other harmful constituents.

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 conditions of local watercourses
- minimisation of impacts on flooding levels and frequencies both upstream and downstream of the project.

The EIS should include a risk assessment for uncontrolled emissions 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 EIS should describe the proposed project component stormwater drainage systems and the proposed disposal arrangements, including any off-site services and downstream impacts.

Where dams, weirs, 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 (EM Plan).

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

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* and the *Queensland Water Quality Guidelines (DERM, 2009)*.

Risks from potentially contaminated surface water flow, particularly during flood events 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.

3.4.2 Groundwater

3.4.2.1 Description of environmental values

The EIS should review the quality, quantity and significance of artesian and non-artesian groundwater resources within the project area.

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
- physical integrity, fluvial processes and morphology of groundwater resources.

This section should include reference to:

- Nature of the aquifer(s):
 - geology/stratigraphy—such as alluvium, volcanic, metamorphic
 - aquifer type—such as confined, unconfined
 - depth to and thickness of the aquifers.
- Hydrology of the aquifer(s):
 - depth to water level and seasonal changes in levels
 - groundwater flow directions (defined from water level contours)
 - interaction with surface water
 - interaction with sea/salt water
 - possible sources of recharge
 - 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 and total dissolved solids.

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.



3.4.2.2 Potential impacts and mitigation measures

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

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

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, and propose management options available to monitor and mitigate these effects. The response of the groundwater resource to the progression and finally cessation of the project should be described.

Any potential for the project to impact on groundwater dependent ecosystems should be assessed and described. Avoidance and mitigation measures should be described.

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

3.5 Coastal environment

This section should describe the existing coastal environment, which may be affected by the project in the context of coastal values identified in *State of the Coastal Zone Reports* and environmental values as defined by the EP Act and environmental protection policies.

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

3.5.1 Marine water and sediment

3.5.1.1 Description of environmental values

Information should be provided on water quality in the sea and in estuaries below the limit of tidal influence, including salinity, heavy metals, pH, turbidity, and oil in water. The interaction of freshwater flow with marine waters and its significance in relation to marine flora and fauna in and adjacent to the project area, should be discussed.

Environmental values of the coastal seas of the affected area should be described, as relevant, in terms of:

- values identified in the EPP (Water)
- the *State Coastal Management Plan* (EPA, 2002) and the *Curtis Coast Regional Coastal Management Plan* (EPA, 2003)
- the Great Barrier Reef World Heritage Area.

An assessment of physical and chemical characteristics of sediments should be provided for:

- the area to be dredged; or
- if offshore disposal is proposed, the disposal location for dredged material
- the littoral and marine zone adjacent to the project area



Any contaminants and implications for management of the dredged material should be described. The description of sediment characteristics should be based on the results of sediment sampling and analysis conducted as per a sampling and analysis plan (SAP) approved under the *Environment Protection (Sea Dumping) Act 1981*.

The chemical and physical characteristics of the material to be dredged, the spoil ground and control sites should be summarised. If the material is to be disposed in an offshore area, a statement as to the suitability of the sediment for unconfined ocean disposal should be made using the framework within the *National Assessment Guidelines for Dredging (DEWHA, 2009)*.

3.5.1.2 Potential impacts and mitigation measures

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

This section should also describe the water quality objectives used (including how they were developed), and how predicted activities will meet these objectives (refer to the *Queensland Water Quality Guidelines*, DERM, 2009, and the Australian and New Zealand *Guidelines for Fresh and Marine Water Quality*, ANZECC & ARMCANZ, 2000).

The potential environmental harm caused by the project on coastal resources and processes should be described in the context of controlling such effects. The State Planning Policy—*Planning and Managing Development Involving Acid Sulfate Soils 2002* should be addressed as should the *State Coastal Management Plan 2001* and the Department of Employment, Economic Development and Innovation *Guidelines for Marine Areas*.

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

Impacts on water quality due to increased water turbidity and nutrients from the sediment due to dredging and sea disposal of material, if required, should be addressed and strategies developed to address potential impacts.

The potential impacts of sediment quality on the marine environment should be discussed. This assessment should be guided by the suitability of the sediment for ocean disposal as determined by the framework outlined in the *National Assessment Guidelines for Dredging (DEWHA, 2009)*.

In addition to the above considerations, the following guidelines and standards should be considered:

- EPP (Water), and any recent or proposed amendments that incorporate recommendations of the *National Environment Protection Measures*
- ANZECC *Australian Water Quality Guidelines for Fresh and Marine Waters (2000)*
- amelioration or mitigation measures to address each activity identified to impact on local and regional water quality
- any monitoring of water quality recommended during the dredging activities to ensure environmental values are protected.



3.5.2 Coastal processes

3.5.2.1 Description of environmental values

This section should describe the physical processes of the adjacent marine environment, including but not limited to currents, tides and storm surges.

The environmental values of the coastal resources of the project area should be described in terms of the physical integrity and morphology of landforms created or modified by coastal processes. Assessment should be based on hydrodynamic investigations and include a description of sediment dynamics at any off-shore disposal ground based on the influence of tides, waves, currents and turbidity.

The relationship of these processes to marine flora and fauna and biological processes within the study area should also be discussed. The relationship between currents, wave actions and extreme events (such as cyclones) and how they influence coastal processes should be discussed.

3.5.2.2 Potential impacts and mitigation measures

The impacts of development of the new berth area on hydrodynamic processes within the harbour should be described. In particular, impacts on siltation and any implications for marine flora and fauna and/or biological processes should be discussed, including generation and migration of turbid plumes.

Information on currents in the harbour should be used to predict impacts, including an assessment of these impacts on marine environmental values. The EIS should discuss strategies to mitigate potential project impacts on coastal processes.

Consideration should be given to the intended size of vessels proposed to access the facility, and associated dredging of access channels. Details should be provided of the capacity and lifespan of existing (including existing approved) reclamation areas to deal with capital and future maintenance dredging to the full extent of development proposed. The potential impacts associated with the frequency of maintenance dredging requirements should be discussed.

3.6 Air quality

3.6.1 Description of environmental values

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

Ambient air quality conditions should be described for any sensitive locations (such as residences) likely to be affected by project emissions. These descriptions should include any baseline monitoring results for particulate matter and gaseous and odorous compounds. In particular, the background levels and sources of suspended particulates, sulphur oxides, nitrogen oxides and any other major constituent of the existing air environment that may be affected by the proposal should be discussed.

Sufficient data on local meteorology and ambient levels of pollutants should be collected to provide a baseline for later studies or for the modelling of air quality environmental impact assessment within the affected air sheds. The meteorological parameters should include air temperature, wind speed and direction, atmospheric stability, mixing depth and other parameters necessary for input to meteorological and air quality models.

The environmental values of the air sheds for affected areas should be described in terms of the EPP (Air).



3.6.2 Potential impacts and mitigation measures

The air quality status of the relevant air sheds should be described and their ability to accept additional pollutant loads generated by the project assessed.

The following air quality issues and their mitigation should be considered:

- nature and quantity of air emissions expected to be generated by project component construction and operational activities
- impacts of dust generation from construction activities (including blasting, excavation and extraction), especially in areas where construction activities are adjacent to existing road networks or are in close proximity to sensitive receivers
- identification of climatic patterns that could affect dust and pollutant generation and movement
- impacts on terrestrial flora and fauna
- predicted changes to existing air quality from vehicle emissions and dust generation along haulage routes (internal and external to construction sites)
- impacts on air quality from gaseous emissions including greenhouse gas emissions and ozone depleting substances.

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

3.6.2.1 LNG plant and gas treatment plants

The objectives for air emissions should be stated in respect of relevant standards (stack and ground level concentrations), relevant emission guidelines, and any relevant legislation, and the emissions modelled using a recognised atmospheric dispersion model. The potential for interaction between the emissions from the plants, and emissions in the air shed, and the likely environmental harm from any such interaction, should also be detailed.

Where appropriate, the predicted ground level concentrations in nearby areas should be provided. These predictions should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions should be identified and modelled where necessary. Ground level predictions should be made at any receptor 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.

With respect to the LNG plant, consideration should also be given to referencing of current DERM and Queensland Health studies being undertaken on the Gladstone air shed and the community reference group on the Clean and Healthy Air for Gladstone Project.

The assessment of the LNG plant's impact on air quality should include the following matters:

- an accurate description of the activities carried out on the site and the surrounding environment
- conceptual block flow diagrams clearly showing all unit operations to be carried out on the premises, detailed discussion of all unit operations, and detailed lists of all process inputs and outputs



- a description of pollution control equipment and pollution control techniques to be employed on the premises and the features of the plant that would be designed to suppress or minimise emissions, including dusts and odours and compare the proposed technologies against the best available control technologies
- a description of the back up measures to be incorporated that will act in the event of failure of primary measures to minimise the likelihood of plant upsets and adverse air impacts
- an air emission inventory of the proposed plant for all potential point, line, area and volume sources including fugitive emissions of dusts and odours. The inventory should provide emission concentrations at standard temperature and pressure, and provide the mass emission rate, exit velocity, volume flow rate and temperature at exit. The estimation of emission rates should be based on actual measurements on samples taken from similar facilities, either full-scale facilities operating elsewhere, or experimental or demonstration-scale facilities. Where this is not possible, use published emission factors and/or data supplied by manufacturers of process and control equipment.
- a comparison of the predicted level of emissions with the best practice national source emission standards.
- air dispersion model estimates of the likely air emission impacts on the surrounding environment. Ground level concentrations at the nearest sensitive receptors based on 1-hour average for maximum (99.9 percentile) and 99.5 percentile values. Results of the dispersion modelling must be presented as concentration contour plots and frequency contour plots. The predicted average ground level concentrations should be made for both normal and expected maximum emission conditions and the worst case meteorological conditions.
- an evaluation of the cumulative impacts on the receiving environment considering the project in conjunction with existing and known future emission sources within the region. The evaluation should describe air shed management and the contribution of the plants to air shed capacity in view of existing and known future users of the air shed for assimilation and dispersion of emissions.
- an odour impact assessment using the criteria described in the Queensland EPA *Guideline of Odour Impact Assessment from Developments*.


3.6.2.2 Air quality modelling requirements

The averaging period for ground level concentrations of pollutants that are modelled should be consistent with the relevant averaging periods for air quality indicators and goals in the EPP (Air) and the National Environmental Protection Measure (NEPM) Air.

The modelling of air quality concentrations at the 'most exposed existing or likely future off-site sensitive receptors' must be compared with the appropriate national and international ambient air quality standards including the EPP (Air) and the National Environmental Protection Council (Ambient Air Quality) Measure.

For the assessment of chemical species not listed in EPP (Air), the design criteria prescribed by the Victorian Government *State Environment Protection Policy (Air Quality Management, 2001)*, based on odour or toxicity classification, could be utilised, or an alternative proposed and approved.

The human health risk associated with emissions from the facility of all hazardous or toxic pollutants should be assessed whether they are or are not covered by the National Environmental Protection Council (Ambient Air Quality) Measure or the EPP (Air).



The limitations and accuracy of the applied atmospheric dispersion models should be discussed. The air quality modelling results should be discussed in light of the limitations and accuracy of the applied models.

3.6.3 Greenhouse gas emissions and abatement

This sub-section of the EIS should:

- provide an inventory of projected annual emissions for each relevant greenhouse gas, with total emissions expressed in 'CO₂ equivalent' terms
- estimate emissions from upstream activities associated with the proposed project, including fossil fuel based electricity consumed
- briefly describe the method(s) by which estimates were made. The emissions may be estimated using the methodology contained in the *National Greenhouse Accounts Factors*, Department of Climate Change (January 2008).
- identify the contribution of the range of GHG mitigation measures incorporated in the plant design. These measures could include the addition of waste heat recovery, additional vapour recovery from ship loading, the use of high efficiency gas turbines and/or compressors, and the use of low BTU fuel.

Greenhouse gas abatement issues should be described and discussed and include:

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

The environmental management plan in the EIS should include a specific module to address greenhouse gas abatement. This module should include consideration of the following:

- project commitments to the abatement of greenhouse gas emissions with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions
- project commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency, in accordance with legislation
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management
- 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

- project commitments to monitor, audit and report on greenhouse emissions from all relevant activities and the success of offset measures.

3.7 Noise and vibration

3.7.1 Description of environmental values

This section should describe the existing environmental values that may be affected by noise and vibration arising from project activities.

Where a proposed activity could adversely impact on a sensitive receptor, baseline noise monitoring should be undertaken. Noise sensitive places are defined in the *Environmental Protection (Noise) Policy 2008* (EPP(Noise)). Background noise levels should be measured in accordance with EPA's (now DERM) guidelines on the measurement of noise and should take into account seasonal variations. The locations of sensitive sites should be identified on a map at a suitable scale.

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 night. Monitoring methods should adhere to accepted best practice methodologies, relevant EPA guidelines and Australian standards, and any relevant requirements of the EPP (Noise).

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

The results of any baseline monitoring of noise and vibration in the proposed vicinity of the project should be described.

3.7.2 Potential impacts and mitigation measures

The potential environmental harm of noise and vibration at all potentially sensitive places, in particular, any place of work or residence should be quantified in terms of objectives, standards and indicators to be achieved and measurable indicators. Particular consideration should be given to emissions of low-frequency noise that is, noise with components below 200 Hz.

The need or otherwise for noise modelling should take into account the distance of relevant project sources of noise from neighbouring sensitive receptors such as residential and commercial developments believed to be sensitive to the effects of noise. Noise from the various components of the project should be modelled, where appropriate, using a suitable acoustic model covering the construction and operational phases.

Proposed measures for the minimisation or elimination of impacts should be provided, including details and illustrations of any screening, lining, enclosing or bunding. A discussion should be provided of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise. This description should also include temporary sensitive places, if applicable.

Information should be supplied on blasting which may cause ground vibration or fly rock on, or adjacent to, the site with particular attention given to places of work, residence, recreation, worship and general amenity. The magnitude, duration and frequency of any vibration should be discussed. A discussion should be provided of measures to prevent or minimise environmental nuisance and harm. Blasting noise and vibration limits are provided in section 440ZB of the Environmental Protection Act 1994. Reference should also be made to the EPA Guideline: *Noise and vibration from blasting*.



The assessment should also address off-site noise and vibration impacts that could arise due to increased road or other transportation directly resulting from the project. Potential noise impacts on terrestrial animals and avifauna, particularly migratory species should also be considered.

Any potential for ground vibration effects on underground pipelines and telecommunication lines should be examined.

3.8 Waste

3.8.1 Waste generation

This section should provide technical details of waste generation, treatment, minimisation and management. Sources of waste associated with the construction, operation and decommissioning of the project should be identified and described including:

- the type and indicative amount of wastes produced, including an estimated inventory of solid and liquid (including wastewater, brine and sewage) wastes generated by each stage and component of the project
- volumes and chemical analysis of wastewater generated by the treatment of associated water for beneficial use
- collection, handling, transport and fate of wastes including storage
- market demand for recyclable waste (where appropriate)
- opportunities for waste avoidance, reuse within the project, and minimisation techniques
- location, site suitability, dimensions, source and volume of any landfill, including method of construction.

3.8.2 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. The proposals for waste avoidance, reuse, recycling, treatment and disposal should be described having regard for best practice waste management strategies and the *Environmental Protection (Waste) Policy 2000*.

This section should assess the potential impacts generated by wastes during the construction, operational and decommissioning stages of the project. This information should include:

- descriptions of processes, equipment and facilities to be incorporated into the overall project specifically for the purpose of avoiding waste generation, separation of wastewater from solid waste, reusing or recycling wastes, or on-site treatment methods for wastes to lessen their effect on the natural environment
- proposed means for 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
- council waste facilities within the project development areas and their ability to handle expected waste generation



- methods to prevent seepage and contamination of groundwater from waste stockpiles
- 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)
- risk assessment and monitoring procedures for individual sites in relation to the above points.

Stormwater management should also address:

- nominated stormwater discharge points and discharge criteria
- 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
- potential impacts during extreme rainfall events
- information on the collection, treatment and disposal of contaminated stormwater runoff from plant and associated materials handling facilities
- details of expected contaminants (e.g. chemical composition, particulates, metals, effluent temperature and pH) in controlled discharges of proposed wastewater and stormwater management systems
- impacts of discharges on potential receiving waters, particularly effects on the downstream environment of stormwater releases (i.e. water-salt balance)
- an outline the expected disposal strategies, where solid or liquid wastes are to be disposed of off-site.

Details of discharge wastewater into Gladstone harbour should identify any potential contaminants likely to impact on approvals for disposal of material from maintenance dredging operations.

3.9 Transport

The assessment of transport impacts should be presented as separate sub-sections of the EIS, for each project-affected mode (road, rail, air and sea) as relevant. The assessment should provide sufficient information to allow an independent evaluation of how existing transport infrastructure will be affected by project transport at both the local and regional levels.

3.9.1 Existing transport infrastructure

Describe the current road and rail networks and intersections of the surrounding region and specify current traffic volumes. The current rail operations occurring during the project construction phase should also be described. This description should identify whether they comprise 24 hours a day/ seven days a week, and the number and types of services per day (e.g. coal, general freight, passenger services). Maps should be provided at an appropriate scale and level of detail.

3.9.2 Transport tasks and routes

The EIS should specify the nature and quantitative estimates of:



- any proposed changes to transport-related infrastructure required by the project. This includes modifications to roads for access works and realignments, rail lines (including level crossings and services) and air and sea port facilities. The EIS should also identify where the construction of project-related plant and utilities may impact on the jurisdiction of any transport authority.
- expected volumes/tonnage of transported raw materials, wastes, and hazardous goods for all phases of the project
- how the identified goods and materials will be moved through the transport network (volume/tonnage, composition, trip timing and routes)
- workforce journey-to-work traffic generated by all project activities. This data should identify traffic mode, volume, composition, timing and routes
- likely heavy and oversize/indivisible loads (volume, composition, timing and routes) highlighting any vulnerable bridges and structures along the proposed routes.

3.9.3 Potential impacts and mitigation measures

The impact assessment should include:

- details of the assessment methodology adopted with a summary of the consultation undertaken with the relevant transport authorities (Department Transport and Main Roads (DTMR), QR Limited and local government)
- details of all base data assumptions, including the current condition of the affected network and its performance
- road and rail safety issues, in particular safety for other transport users and safe access to the construction sites
- road use resulting in reduced life of roads/pavements requiring additional or accelerated rehabilitation and maintenance
- 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 estimates of possible interruptions to transport operations
- reduced efficiency of rail operations including estimates of possible interruptions to rail operations.
- details of any impacts on the natural environment within the jurisdiction of an affected transport authority (for example road and rail corridors)
- details on the nature and likelihood of product-spill during transport where relevant.

3.9.3.1 Road impacts

The description and analysis should address the capacity of existing facilities to support the requirements and any additional requirements for the construction, upgrading or relocation of any transport related infrastructure required by the project directly and as a result of potential cumulative impacts. The analysis should also address any requirements for new or changed services in road reserves.

The assessment of road impacts should address the issues outlined in the DMR publication *Guidelines for Assessment of Road Impacts of Development (2006)*. Reference should be made to other DTMR planning documents and relevant legislation.



This section should also address how transport elements and impacts of the project, taking into account publicly published or DIP advised future demand growth, (including the potential impact of other major infrastructure and industrial projects in the nearby area) relate DTMR's existing transport strategies for the Central Queensland area and the future infrastructure needs of this area as presented in State Government documents, including Statements of Intent for Road Link Development and *Gladstone Integrated Regional Transport Plan 2001-2030*;

The EIS should also discuss the results of consultation with the relevant district and regional officers of DTMR and local government regarding the potential impacts of the project on the road network.

In particular, the assessment should describe:

- impacts (from either transport or project operations) on the safety, efficiency and condition of road operations and assets
- impacts on overland water-flows and their interaction with the road network
- impact of driver fatigue for workers travelling to and from regional centres and key destinations
- impacts on any existing public transport networks (assets and services).

3.9.3.2 Rail impacts

The assessment of rail impacts should consider:

- project impacts on the amenity and health of adjacent land users as a result of dust, noise and vibration
- impacts on transport and services, should the project generate large trip movements.

3.9.4 Proposed infrastructure alterations

The EIS should detail proposed alterations to road and rail infrastructure occasioned by the project. This includes road realignments, grade separated crossings, level crossings, road upgrades and resurfacing, bridges, access roads, and associated civil works.

Special reference should be made to any relationship between road works undertaken as part of the project and works proposed in DTMR's *Roads Implementation Program* where details of such works are provided by the DIP to the proponent or otherwise published. Any proposed new infrastructure provision or requirements to mitigate impacts of development on State-controlled roads should be in accordance with DTMR's *Road Planning and Design Manual*.

The EIS should also discuss the results of consultation with the relevant district and regional officers of DTMR and local government regarding the potential impacts of the project on the road network and proposed infrastructure alterations.

This consultation should also discuss developing an integrated approach with this and other existing or planned projects (whether publicly published or advised by DIP) known to the proponent.



3.9.5 Road management planning

A traffic analysis should be presented to indicate the impacts or improvements to traffic flows and capacity both during construction and after completion. Particular attention should be paid to:

- requirements for access to road/rail corridors during construction, including emergency access
- methods to be adopted to ensure safety and avoid obstruction to other road/rail users during construction
- proposed traffic management arrangements and plans
- capacity and safety improvements as a result of road infrastructure alterations.

This section should also address how transport elements and impacts of the project, taking into account publicly published or DIP advised future demand growth, (including the potential impact of other major infrastructure and industrial projects in the nearby area) relate to DTMR's existing transport strategies for the Central Queensland area and the future infrastructure needs of this area as presented in State Government documents, including Statements of Intent for Road Link Development and *Gladstone Integrated Regional Transport Plan 2001-2030* and *Capricornia Integrated Regional Transport Plan 2004-2030*. It is also necessary to make reference to publicly published or DIP advised planning schemes of the relevant local governments.

This section should outline:

- procedures for assessing and agreeing on the scope of required infrastructure alterations 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
- steps to be taken to prevent access from public roads/rail corridors to the project sites
- strategies to maintain safe access to public road/rail reserves to allow road/rail/pipeline maintenance activities
- process for decommissioning of any temporary access to road/rail reserves—for example, stockpile sites.

Findings of studies and transport infrastructure impact assessments should be an input into preparing a draft road-use management plan. Conditions of approval for transport management impacts should also be detailed in the EM Plan (see section 7.0).

3.9.6 Shipping

The Regional Harbour Master Gladstone should be consulted regarding maritime issues relating to the movement and loading of LNG tankers and any barge operations. The EIS should discuss the results of the consultation.

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

In relation to shipping of LNG, details of the number of ships utilising Gladstone Ports Corporation (GPC) port facilities and their size and frequency should be documented. In particular, changes to any of the following are to be described:

- berthing/departure requirements including weather constraints



- security zones around the vessels both in berth and in transit, together with impacts on other maritime operations
- interaction with other vessels
- scheduling of vessel movement
- channel configuration, including swing basins
- towage requirements, including provision of escort tugs (if necessary) and having the use of LNG vessel dedicated escort tugs
- pilot requirements
- parameters of vessels to be used
- arrival and departure conditions of the vessels
- anchorage arrangements
- access to and from the port, shipping routes to be used by vessels beyond the port in Commonwealth marine waters. These should be indicated in relationship to the GBRMP and to the main shipping channels
- any other navigational arrangements
- any additional servicing of vessels.

In regard to increased shipping volumes, the following should be specifically addressed:

- potential for introduction of exotic organisms from increased shipping rates
- ballast water management arrangements - including Australian Quarantine and Inspection Service (AQIS) mandatory arrangements and agency contingency planning
- management of ship waste, in particular quarantine waste, domestic garbage, oil and sewage
- potential risk of spills and their management
- potential foreshore damaged caused by LNG tanker and tug activities
- potential for increased vessel strike to marine species
- potential impacts on existing shipping activity from both LNG ship movements and if the project should generate a significant degree of public or private ferry or barge movements in the port
- routes of ships in transit through port waters and the aligned infrastructure such as navigational aids.

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

3.9.7 Air services

The air services and their current capacity serving the Gladstone region should be described. Projections should be made of the requirements of the project for air transport to and from Gladstone, and the services required to supply these projections. An assessment is required of the infrastructure needed to support the projected level of air services.



3.10 Indigenous cultural heritage

3.10.1 Description of indigenous cultural heritage values

This section should describe the known Aboriginal cultural heritage values including significant Aboriginal areas that may be affected by the project.

The section should also describe how, in conjunction with the appropriate Aboriginal people, the Aboriginal cultural heritage values were ascertained. This might include, for example, the results of any Aboriginal cultural heritage survey undertaken, the DERM *Aboriginal Cultural Heritage Register and Database* and any existing literature relating to Aboriginal cultural heritage in the project area.

3.10.2 Potential impacts and mitigation measures

This section should define and describe the practical measures for protecting Aboriginal cultural heritage values including describing the strategies to be applied for Aboriginal cultural heritage management, and how the achievement of the strategies will be undertaken.

To the extent practicable, significant Aboriginal areas should be avoided by the project. The EIS should provide an assessment of likely effects on Aboriginal cultural heritage values of the project, including but not limited to the following:

- description of the Aboriginal cultural heritage values likely to be affected by the project including any national significance
- recommended means of mitigating any negative impact on Aboriginal cultural heritage values by appropriate management strategies.

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

A native title agreement, as that term is defined under the *Aboriginal Cultural Heritage Act 2003* (ACH Act), that includes management and protection strategies for Aboriginal cultural heritage (NT agreement) or a Cultural Heritage Management Plan under the ACH Act (CHMP) should be initiated during the EIS process. An NT agreement or an approved CHMP in a form which complies with Part 7 of the ACH Act will ensure that the project meets the Aboriginal cultural heritage duty of care imposed by the ACH Act.

If an NT agreement is not finalised or, a CHMP has not been approved, by the time of submission of the EIS to the CG then the following should be provided:

- subject to any confidentiality restrictions, an outline of the proposed management and protection strategies for Aboriginal cultural heritage within the proposed CHMP or NT agreement, including outlining the position of the relevant parties and the status of negotiations
- details of the proposed steps and timeframes for finalising the CHMP or NT agreement.

An NT agreement or CHMP should be negotiated between the proponent and the appropriate native title/ Aboriginal parties and should address and include the following (subject to contrary agreement between the parties):

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



- processes for mitigation, management and protection of identified Aboriginal cultural heritage in the project areas, including associated infrastructure developments, during both the construction and operational phases of the project
- provisions for the management of the accidental discovery of Aboriginal cultural heritage, including human remains
- a clear recording process to be developed to assist initial management and recording of accidental discoveries
- a cultural heritage induction for project staff
- the development of a cultural heritage awareness program
- a conflict resolution process.

3.11 Non-indigenous cultural heritage

3.11.1 Description of non-indigenous cultural heritage values

The EIS should describe the existing environmental values for non-indigenous cultural heritage that may be affected by the project activities. The non-indigenous cultural heritage survey should:

- refer to:
 - the *Australian Heritage Places Inventory*
 - the DERM *Queensland Heritage Register* and other information regarding places of potential non-indigenous cultural heritage significance
 - local government heritage register
 - any existing literature relating to the affected areas
- refer to consultations and negotiations with the local community and historical societies about:
 - places of non-indigenous cultural heritage significance
 - the significance of any non-indigenous cultural heritage places located or identified
- include locations of culturally significant sites likely to be impacted by the project
- provide a constraints' analysis of the proposed development area to identify and record non-indigenous cultural heritage places
- provide the location of any mining areas with historical significance
- provide a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and conclusions and management recommendations (having due regard for any confidentiality requirements specified by community representatives).

3.11.2 Potential impacts and mitigation measures

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



- description of the significance of items or places of conservation or non-indigenous cultural heritage value likely to be affected by the project and their values at a local, regional and national level
- recommended means of mitigating any negative impacts on non-indigenous cultural heritage values and enhancing any positive impacts
- where relevant, negotiations with Queensland Heritage Council and DERM regarding management of places of historic heritage significance, taking account also of community interests and concerns
- documented management strategies in accordance with the outcomes of negotiations with Queensland Heritage Council, DERM and the community.

As a minimum, investigations, consultation, impact assessment, management and protection strategies should satisfy statutory responsibilities and duties of care, including those under the EPBC Act and *Queensland Heritage Act 1992*. MNES are to be discussed in section 8.



4 Social values and management of impacts

4.1 Social

The social impact assessment (SIA) should be conducted in consultation with the DIP Social Impact Unit. Matters to be considered include the social and cultural area, community engagement, a social baseline study, a workforce profile, potential impacts and mitigation measures and management strategies.

4.1.1 Social and cultural area

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

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

4.1.2 Community engagement

Consistent with national and international good practice, the proponent should engage at the earliest practical stage with likely affected parties to discuss and explain the project, and to identify and respond to issues and concerns regarding social impacts.

This section of the SIA should detail the community engagement processes used to conduct open and transparent dialogue with stakeholders. This dialogue should include the project's planning and design stages and future operations including affected local and state authorities. Engagement processes will involve consideration of social and cultural factors, customs and values and relevant consideration of linkages between environmental, economic, and social impact issues.

4.1.3 Social baseline study

A targeted baseline study of the people residing in the project's social and cultural area is required to identify the project's critical social issues, potential adverse and positive social impacts, and strategies and measures developed to address the impacts. The social baseline study should be based on qualitative, quantitative, and participatory methods. It should be supplemented by community engagement processes, and reference relevant data contained in local and state government publications, reports, plans, guidelines and documentation, including regional plans and, where available, community plans.

The social baseline study should describe and analyse a range of demographic and social statistics determined relevant to the project's social and cultural area including:



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

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

- the social infrastructure including community and civic facilities, services and networks (for definition see *South East Queensland Plan 2005-2026 Implementation Guidelines No. 5*: www.dip.qld.gov.au/resources/guideline/Implementationguideline5.pdf)
- settlement patterns including the names, locations, size, history and cultural aspects of settlement in the social and cultural area
- the identity, values, lifestyles, vitality, characteristics and aspirations of communities in the social and cultural area, including Indigenous communities
- land use and land ownership patterns including:
 - rural properties, farms, croplands and grazing areas including on-farm activities near the proposed activities
 - the number of properties directly affected by the project
 - the number of families directly and indirectly affected by the project including Indigenous traditional owners and their families, property owners, and families of workers either living on the property or workers where the property is their primary employment.



- use of the social and cultural area for forestry, fishing, recreation, business and industry, tourism, aquaculture, and Indigenous cultural use of flora and fauna.

4.1.4 Workforce profile

The SIA should include a profile of the workforce which describes:

- 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 operation, and arrangements for their transport to and from the project areas, including proposed use of regional or charter air services
- estimates should be provided according to occupational groupings and variations in the workforce numbers for the duration of the project and show anticipated peaks in worker numbers during the construction period.

The SIA should provide an outline of recruitment schedules and policies for recruitment of workers, addressing recruitment of local and non-local workers including Indigenous workers and people with a disability.

If re-locatable camp sites are to be used to accommodate the workforce, details on the number, size, location (shown on a map), management, proximity to the construction site, and typical facilities for these sites should be provided. The duration and any variations in workforce numbers within the proposed camp should also be provided. Information should outline any local government or other regulatory approvals required for establishment and operation of such camps, including building, health and safety and waste disposal purposes.

The section should provide information in relation to the location of other major projects or proposals under study within the social and cultural area together with workforce numbers.

4.1.5 Potential impacts

This section of the SIA should assess and describe the type, level and significance of project's social impacts (both beneficial and adverse) on the local and cultural area, based on outcomes of community engagement processes and the social baseline study. Further it should:

- describe and summarise outcomes of community engagement processes including the likely response of the affected communities, including Indigenous people
- include sufficient data to enable affected local and state authorities to make informed decisions about the project's effect on their business and plan for the provision of social infrastructure in the project's social and cultural area. If the project is likely to result in a significant increase in the population of the area, then the proponent should consult the relevant management units of the state authorities and summarise the results of the consultations
- address direct, indirect and secondary impacts from any existing projects and the proposed project including an assessment of the size, significance, and likelihood of these impacts at the local and regional level. Considering the following:
 - key population/ demographic shifts; disruptions to existing lifestyles, the health and social wellbeing of families and communities; social dysfunction including alcohol and drugs, crime, violence, and social or cultural disruption due to population influx
 - the needs of vulnerable groups including women, children and young people, the aged and people with a disability



- Indigenous people including cultural property issues
- local, regional and state labour markets, with regard to the source of the workforce. This information is to be presented according to occupational groupings of the workforce. In relation to the source of the workforce, information is required as to whether the proponent, and/or contractors, is likely to employ locally or through other means and whether there are initiatives for local employment business opportunities
- proposed new skills and training related to the project including the occupational skill groups required and potential skill shortages anticipated
- comment on how much service revenue and work from the project would be likely to flow to the project's social and cultural area
- impacts of construction and operational workforces, their families, and associated contractors on housing and accommodation availability and affordability, land use and land availability. The capability of the existing housing and rental accommodation, to meet any additional demands created by the project is to be discussed including direct impacts on Indigenous people.

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

4.1.6 Mitigation measures and management strategies

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

- the recruitment and training of the construction and operational workforces and the social and cultural implications this may have for the host community, including if any part of the workforce is sourced from outside the social and cultural area
- housing and accommodation issues, in consultation with relevant local authorities and state government agencies, with proposals for accommodating the project workforce and their families that avoid, mitigate or offset any short and medium term adverse effects on housing affordability and availability, including the rental market, in the social and cultural area
- the demographic changes in the profile of the region and the associated sufficiency of current social infrastructure, particularly health and welfare, education, policing and emergency services
- the adequate provision of education, training and employment for women, people with a disability, and Indigenous peoples.

The proponent should describe any consultation about acceptance of proposed mitigation strategies and how practical management and monitoring regimes are proposed to be implemented.

A draft social impact management plan should be presented that promotes an active and ongoing role for impacted communities and local authorities through the project life cycle. The draft plan should cover:

- assignment of accountability and resources



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



4.2 Health and safety

4.2.1 Description of environmental values

This section should describe the existing community values for public health and safety that may be affected by the project. Populations likely to be affected by air emissions including odours should be identified and described. Particular attention should be paid to those sections of the population, such as children and the elderly that are especially sensitive to environmental health factors.

4.2.2 Potential impacts and mitigation measures

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

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

Maps should be provided showing the locations of sensitive receptors, such as, but not necessarily limited to, kindergartens, schools, hospitals, aged care facilities, residential areas, and centres of work (e.g. office buildings, factories and workshops). The EIS, illustrated by the maps, should discuss how planned discharges from the project could impact on public health in the short and long term, and should include an assessment of the cumulative impacts on public health values caused by the 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. Measures to control mosquito and biting midge breeding should be described. Any use of recycled water should be assessed for its potential to cause infection by the transmission of bacteria and/or viruses by contact, dispersion of aerosols, and ingestion (e.g. via use on food crops). Similarly, the use of recycled water should be assessed for its potential to cause harm to health via the food chain due to contaminants such as heavy metals and persistent organic chemicals. Practical monitoring regimes should also be recommended in this section.



5 State and local economies and management of impacts

5.1 Economy

5.1.1 Description of affected local and regional economies

This section should describe the existing economy(s) in which the project is located, and the economies materially impacted by the project. In particular, the following information should be provided:

- definition of the economy in which the project is to be located
- description of the economy including:
 - gross regional product or other appropriate measure of annual economic production
 - population
 - labour force statistics
 - infrastructure
- description of the regional economy's key industries and their contribution to regional economic income
- description of the key regional markets relevant to the project:
 - labour market
 - housing and land markets
 - construction services and building inputs market
- description of the region's key industries and their current input costs (wage rates, building costs, housing rent, etc)
- discussion of land values in the region by type of use.

5.1.2 Potential impacts and mitigation measures

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

The analysis should include the direct economic impacts on industry and the community including:

- property values
- industry output
- employment
- factor incomes.

The general economic benefits/ impacts from the project should be described, including:

- the relative significance of this proposal in the local and regional economic context
- the extent to which local and other Australian goods and services will be used



- the short and long-term beneficial (e.g. job creation) and adverse (e.g. competition with local small business) impacts that are likely to result from the development
- the potential needs for skills training in the new LNG industry
- the need for any additional infrastructure provision by government to support the project
- implications for future development in the locality (including constraints on surrounding land uses and existing industry)
- the potential impact of the project on the domestic gas market and domestic gas prices, including the ability of the power generation sector to meet government emission targets and gas-power level targets.

Any new skills and training to be introduced in relation to the project should be identified. Adequate provision should be made for apprenticeship and worker training schemes. The EIS should indicate the occupational skill groups required and potential skill shortages anticipated.

The economic assessment should outline strategies to mitigate disruption to the local economy during construction and operation to address:

- all potential changes to industry practices likely to occur during construction and operation of the project
- all potential impacts on households (travel time, noise etc) likely to occur during construction and operation of the project
- the estimated cost of these changes, if material
- the measures to be taken to minimise disruption or alleviate cost impacts of the project.

5.2 Sustainable development

The EIS should provide a comparative analysis of how the project conforms to the objectives for 'sustainable development' (see the *National Strategy for Ecologically Sustainable Development (1992)*, available from the Australian Government Publishing Service).

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

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



6 Hazard and risk

6.1 Hazard and risk assessment

This section of the EIS should describe the potential hazards and risks that may be associated with the project and should incorporate all known hazards, which may include:

- identification of potential hazards, accidents, spillages and abnormal events occurring during all stages of the project, including possible frequency of occurrence
- indication of cumulative risk levels to surrounding land uses
- identification of all hazardous substances to be used, stored, processed or produced and the rate of usage
- potential wildlife hazards such as snakes and disease vectors.

The EIS should deal with on-site risks. External risks to the project should also be considered. External risks from natural hazards could be determined on the basis of Australia/New Zealand Standard on Risk Management AS/NZS 4360:2004. The study should assess risks during the construction, operational and decommissioning phases of the project. These risks should be assessed in quantitative terms where possible. Possible hazards, accidents, and abnormal events that may arise for the project, both during construction and in operation should be described, including:

- accidental release of hazardous goods or other materials
- fires associated with incidents arising from the project activities
- vehicle and other transport-related accidents
- vulnerability of the project area to bushfire, flooding, cyclones, seismic events and other natural disasters.

Analysis of the consequences of each of these events on safety and environmental damage in the project area should be conducted, including direct harm to the environment as a result of project hazards. The analysis should examine the likelihood of these consequences being experienced, both individually and collectively. In regard to the on-site handling and storage of explosive raw material, consultation is encouraged with Emergency Management Queensland, Chemical Hazards and Emergency Management Services Unit.

Details should be provided on the safeguards that would be employed or installed to reduce the likelihood and severity of hazards, consequences and risks to persons, fauna and environmentally sensitive sites within and adjacent to the project areas.

The EIS should identify all legislation, standards and codes of practice in relation to the transport, storage and handling of hazardous materials and in particular dangerous cargoes in port areas.

6.1.1 Feed gas pipeline

A risk assessment in accordance with Australia/New Zealand Standard *AS/NZS 2885 Gas and Liquid Petroleum Pipelines* should be conducted on the gas transmission pipeline from Gladstone City Gate to the LNG plant on Curtis Island. The results of the location analysis and threat analysis and calculation of 'measurement lengths' should be presented together



with management strategies which will be employed to deliver the safety principles of the standard that require risks to be reduced to as low as reasonably practical, low or negligible.

6.1.2 LNG plant and LNG transport

The LNG plant is considered to be a major hazard facility in terms of the *Dangerous Goods Safety Management Act 2001*. The study should assess risks associated with the LNG plant and the shipment of LNG, during the construction, operational and decommissioning stages. These risks should be assessed in quantitative terms where possible, and should involve a preliminary hazard identification exercise to identify the nature and scale of hazards which might occur. This exercise should consider the following matters:

- terrorist attack, specifically addressing Queensland counter terrorism and critical infrastructure policies
- the emergency management plan is to include a maritime security plan which meets Commonwealth's security requirements
- construction accidents
- pipeline, processing unit or storage vessel rupture or loss of containment, and explosions and fires associated with such incidents
- the release of liquid gaseous or particulate pollutants or any other hazardous material used, produced or stored on the site
- impact of LNG flare on the aviation industry
- marine collision
- spills of materials during ship loading and unloading
- the potential for breaching of an LNG or LPG vessel's hull and the resulting breach size and spill rate
- the extent of thermal dispersion and resulting hazard/ignition zones following an LNG or LPG spillage (e.g. 35 kWm² and 5 kWm² analysis)
- natural events such as cyclones, earthquakes, bushfires and local flooding.

In particular, risk assessments of marine operational activities (when LNG and LPG vessels are at berth, during loading and during vessel movements within the port limits) should be undertaken to determine if operational activities associated with these vessels are likely to impact on other operational activities within the port.

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

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



6.1.3 Cumulative risk

The risk analysis is to address the potential impacts that may occur on the normal on-site day-to-day activities during the construction and/or operation of the facilities. Furthermore, the project must determine the level of change that may result on the risk contours of other relevant existing or proposed industrial facilities located in the area as a result of the proposed project. Individual risk criteria should be used to limit risks to individual workers and members of the public. Societal risk criteria should be used to limit risk to the affected population as a whole.

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. Draft risk management plans are to be presented for construction and operational phases of the project.

The acceptability of the risk on-site and 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*. Details of the methodology and results of each step described above should be presented in the EIS.

6.2 Emergency management plan

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

- terrorist attack
- marine collision minimisation
- fire prevention/protection
- leak detection/minimisation
- release of contaminants
- emergency shutdown systems and procedures.

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. This should include 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. Planning should include reference to *State Planning Policy 1/03, Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*.

In particular, the following should be presented:

- outline of contingency plans to deal with hydrocarbon (e.g. diesel, lubricating oils) spills during construction, operation and maintenance of the project
- outline of contingency plans to account for natural disasters such as storms, flooding and fires during the construction, operation and maintenance phases
- outline of emergency planning and response procedures that have been determined in consultation with state and regional emergency service providers



- outline of plans for involvement of the relevant state agencies (such as the Department of Community Safety, which includes the Queensland Ambulance Service, Queensland Fire and Rescue Service and Emergency Management Queensland) in relation to emergency medical response and transport, and first aid matters.



7 Cumulative impacts

The purpose of this section is to provide a summary of the cumulative impacts from the project which should have regard to both geographic location and environmental values.

Cumulative impacts should take into consideration the effects of other known, existing or proposed project(s) where details of such projects have been provided to the proponent by the DIP or which are otherwise published to the greatest extent possible. In particular, the likelihood of cumulative impacts arising from possible shared gas transmission pipeline easements and adjoining or nearby LNG plant proposals should be addressed, where adequate information is available. With respect to Gladstone in particular, the cumulative social and economic impacts arising from large project workforces associated with proposed industrial projects being constructed in overlapping timeframes should be addressed.

The requirements of any relevant state planning policies, environmental protection policies, national environmental protection measures, statutory policies, water resource planning and any other relevant plans should also be addressed.

The methodology used to determine the cumulative impacts of the project should be discussed, including (to the extent possible) qualitative and quantitative criteria.



8 Matters of national environmental significance

The controlling provisions under the EPBC Act have been determined as:

- sections 12 and 15A (World Heritage properties)
- sections 15B and 15C (National Heritage place)
- sections 18 and 18A (Listed threatened species and communities)
- sections 20 and 20A (Listed migratory species).

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

The project should initially be assessed in its own right followed by an assessment of the cumulative impacts related to all known proposed major industrial developments in the project component study areas with respect to each controlling provision, and relevant identified consequential actions.

Predictions of the extent of threat (risk), impact and the benefits of any mitigation measures proposed, should be based on sound science and quantified where possible. All sources of information relied upon should be referenced and an estimate of the reliability of predictions provided. Any positive impacts should also be identified and evaluated.

If environmental offsets are required, in accordance with the EPBC *Draft Environmental Offsets Policy Statement (August 2007)*, then an offset strategy should be proposed.

The extent of any new field work, modelling or testing should be commensurate with risk and should be such that when used in conjunction with existing information, provides sufficient confidence in predictions that well informed decisions can be made. Obligations under and implications of any species recovery plans must be specifically addressed.

8.1 Impacts on World Heritage properties and National Heritage places

The EIS should provide:

- a description of the values of the Great Barrier Reef World Heritage Area (GBRWA) and National Heritage places that are likely to be impacted by the project, including but not restricted to the significant regional habitat for listed threatened and migratory marine species.
- a description of the potential direct and indirect impacts on the values of each area, place, site or reserve, resulting from:
 - modification, destruction, fragmentation, isolation or disturbance of an important, sensitive or substantial area of habitat
 - a substantial change in water quality (including temperature) and hydrological regime which may adversely impact on biodiversity, ecological integrity, social amenity or human health



- persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.
- a description of the impacts on other users of the area.
- a discussion of the extent to which identified impacts can be forecast or predicted and managed.
- a description of any mitigation measures proposed to reduce the impact on the values and environments of each area, place, site or reserve.

8.2 Impact on a listed threatened species and ecological communities

The EIS should provide a description of EPBC Act listed threatened species and ecological communities likely to occur in the project study area.

The EIS should consider and assess the impacts to identified listed threatened species and communities that may be impacted by the project. The EIS should identify which component of the project is of relevance to each species or community or if the threat of impact relates to consequential actions. Impacts may result from:

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

Any positive impacts should also be identified and evaluated.

A description of any mitigation measures proposed to reduce the impact on the listed threatened species and ecological communities should be discussed.



8.3 Impact on a listed migratory species

The EIS should provide a description of the EPBC Act listed migratory species, distribution, life history, habitats etc likely to occur in the project study area.

The EIS should consider and assess the impacts to the identified listed migratory species that may be impacted by the project. The EIS should identify which component of the project is of relevance to each species or if the threat of impact relates to consequential actions. Impacts may result from:

- the destruction, isolation or modification of habitat important to a migratory species
- the introduction of invasive species in an important habitat that would be harmful to a migratory species
- the disruption of the lifecycle (breeding, feeding, migration, or resting behaviour) of an ecologically important proportion of the population of a migratory species
- interference with the recovery of the species or ecological community
- actions which may be inconsistent with a recovery plan.

Any positive impacts should also be identified and evaluated.

A description of any mitigation measures proposed to reduce the impact on migratory species should be discussed.

8.4 Format of MNES Section

This section of the EIS report should be a stand-alone section and should exclusively and fully address the issues relevant to the EPBC Act controlling provisions. It should adopt the following outline:

1. introduction, including title of EPBC Referral and numbers, and brief description of the project
2. description of proposed action (as it would impact on MNES)
3. description of the affected environment and values 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 (in accordance with available guidelines and species recovery plans)
5. an outline of environmental management plan that sets out the framework for continuing management, mitigation and monitoring for the relevant impacts of the action and the name of the agency responsible for endorsing or approving each mitigation measure or monitoring programme
6. other approvals and conditions e.g. permits for vegetation clearing, local, state planning schemes or plan or policy and a description of any approval that has been obtained from a state or Commonwealth agency or authority
7. environmental record of person proposing to take the action (proponent) – details of any proceedings under a Commonwealth, state or territory law for the protection of the



environment or the conservation and sustainable use of natural resources against the proponent and for an action for which the person has applied for a permit; if the proponent is a corporation; details of the corporation

8. conclusions
9. references and linkages to relevant sections of the EIS.



9 Environmental management plan

This section of the EIS should detail the EM Plan developed for the project. The EM Plan should be developed from, and be consistent with, the preceding information in the EIS and meet the statutory requirements for EM Plans under S310D of the EP Act and be consistent with the EPA Guideline: *Preparing an environmental management plan (EM Plan) for level 1 petroleum activities* (2007) or as subsequently updated.

An EM Plan should provide control actions in accordance with agreed performance criteria for specified acceptable levels of environmental harm.

In addition, the EM Plan should identify:

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

The aim of the EM Plan is 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 federal government authorities, stakeholders and the proponent with a common focus for approvals conditions and compliance with policies and conditions
- the community with evidence that the environmental management of the project is acceptable.



The recommended structure of the EM Plan is:

Element/issue	Aspect of construction or operation to be managed (as it affects environmental values)
Operational policy	Operational policy or management objective that applies to the element
Performance criteria	Measurable performance criteria (outcomes) for each element of the operation
Implementation strategy	Strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria
Monitoring	Monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change)
Auditing	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	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 EM Plan should commit to manage, enhance or protect identified environmental values. The commitments should contain the following components for performance criteria and implementation strategies:

- environmental protection objectives for enhancing or protecting each relevant value
- indicators to be measured to demonstrate the extent to which the environmental protection objective is achieved
- environmental protection standards (a numerical target or value for the indicator), which defines the achievement of the objective
- an action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
 - communication
 - continuous improvement
 - environmental auditing
 - monitoring
 - reporting



- staff training
- a decommissioning program for land proposed to be disturbed under each relevant aspect of the project.



10 Conclusions and recommendations

The EIS should make conclusions and recommendations with respect to the project based on the studies presented, the EM Plan and conformity of the project with legislative and policy requirements.

11 References

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

12 Recommended appendices

12.1. Final TOR for this EIS

A copy of the final TOR should be included in the EIS.

12.2. TOR cross-reference table

A cross reference table should be provided which links the requirements of each section/subsection of the TOR with the corresponding section/subsection of the EIS where those requirements have been addressed.

12.3. Development approvals

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

12.4. Summary consultation report

A summary consultation report should be provided which lists the advisory agencies consulted, and the individuals and groups of stakeholders consulted.

The EIS should summarise the results of the community consultation program, providing a summary of 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.

12.5. Study team

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

12.6. Glossary of terms

A glossary of technical terms and acronyms should be provided.



12.7. Specialist studies

All specialist studies undertaken as part of the EIS should be reported as appendices to the EIS.

12.8. Corporate environmental policy

The proponents should attach a copy of their corporate environmental policies and planning framework documents.

12.9. List of proponent commitments

A list of all commitments made by the proponent(s) in the EIS should be provided together with a reference to the relevant section in the report.