



The Coordinator-General



Coordinator-General's evaluation report for an environmental impact statement

Gladstone Liquefied Natural Gas—GLNG project

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

May 2010



Gladstone Liquefied Natural Gas—GLNG project

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Synopsis

This Coordinator-General's report has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) process for the Gladstone Liquefied Natural Gas Project (the project). The Department of Infrastructure and Planning (DIP) managed the impact assessment process for this project on my behalf in accordance with the SDPWO Act.

The report includes an assessment and conclusions about the environmental effects of the project and any associated mitigation measures. Assessed material includes: the EIS, supplementary report to the EIS; properly made submissions and other submissions that have been accepted; and any other material that is relevant to the project—such as comments and advice from advisory agencies and other entities, technical reports and legal advice.

Santos Limited (Santos) and its joint venture partner PETRONAS are proposing to develop their Queensland coal seam gas (CSG) resources in the Bowen and Surat Basins in the area between Roma and Emerald as feed gas for a liquefied natural gas (LNG) liquefaction and export facility on Curtis Island, near Gladstone, Queensland. The LNG facility will have an initial capacity of 3 – 4 million tonnes per annum (Mtpa) but will have the potential for later expansion to a nominal 10 Mtpa.

The Gladstone Liquefied Natural Gas (GLNG) project has the following major components:

- LNG liquefaction and export facility of three trains (LNG facility)
- Coal seam gas fields (of approximately 5 300 petajoules (PJ) which is sufficient gas to supply at least the first train of the LNG facility)
- a gas transmission pipeline (with capacity for gas for three trains of the LNG facility).

Other components of the project include a potential bridge, road and service corridor to provide access to Curtis Island; and supporting marine infrastructure including a product loading facility, a materials offloading facility and channel dredging.

The CSG fields will be developed over a period of approximately 10 years to provide approximately 5300 PJ of coal seam gas to the first train of the LNG facility.

The 435 km long gas transmission pipeline will link the CSG fields to the LNG facility.

The LNG facility will be located in the south-west section of Curtis Island and will liquefy the gas to enable it to be transferred to ships for export.

An initial advice statement (IAS) was lodged with the Coordinator-General on 10 July 2007 and the project was declared to be a 'significant project for which an EIS is required', pursuant to section 26(1)(a) of the SDPWO Act on 16 July 2007.

The draft terms of reference (TOR) were advertised for public and advisory agency comment on 24 May 2008. Advisory agency briefings were held in Brisbane on 10 June 2008. Submissions on the draft TOR closed on 20 June 2008.

A total of 32 submissions were received by DIP with 19 from advisory agencies and 13 from the general public, commercial operations and environmental non-government organisations. The final TOR were approved by the Coordinator-General on 20 August 2008.

The EIS was approved by the Coordinator-General for release and publicly advertised on 24 June 2009. Eight weeks was allowed for consultation concluding on Monday 17 August 2009.

Advisory agency briefings were held in Gladstone on 23 July 2009 and in Brisbane on 17 July 2009.

Some 42 submissions were received by DIP with 20 from advisory agencies and 22 from the general public, commercial operations and environmental non-government organisations. These were recorded by DIP and provided to Santos for appropriate consideration and response.

Following receipt and analysis of submissions, it was determined by the Coordinator-General that a supplementary report to the environmental impact statement (SEIS) would be required for the project.



The SEIS was delivered to DIP on 10 December 2009 and was issued to advisory agencies for review, and for information to general public submitters who raised issues on the earlier EIS. Comments were invited during the consultation period from 16 December 2009 to 1 February 2010. A total of 21 submissions were received on the SEIS.

The submissions received from the SEIS consultation process indicated satisfaction with issues raised or suggested actions or conditions to address outstanding issues. These responses have been discussed with the proponent and with relevant agencies. These matters have been taken into consideration in the preparation of this report and conditions contained therein. While the main assessment in this report is of the GLNG report, **I have** where relevant considered cumulative impacts in determining the conditions by which this project can proceed.

The following outlines the major issues and how they are dealt with in the Coordinator-General's report:

1. Accommodation on Curtis Island

Although accommodation facilities are not a preferred use in the Curtis Island precinct, Santos and other similar proponents have submitted plans for temporary worker accommodation facilities on their LNG plant sites. Potential cumulative impacts of a workforce of 8 000 from 4 LNG projects in Gladstone and their daily movement on land and across the harbour indicate to me that the use of temporary workers accommodation facilities on Curtis Island is warranted for most of the fly in fly out workforce. **I will** take this factor into account in terms of the size and duration of this facility, when considering the Material Change of Use decision for the LNG facilities on Curtis Island.

2. Crossing of the Narrows

Potential impacts from up to four gas transmission pipeline routes from LNG projects proposed between 2010 and 2013, crossing through wetlands and the Narrows, all located within the Australian Government Great Barrier Reef World Heritage Area, strongly indicates to me a bundled pipeline trenched construction methodology should be adopted by all proponents to allow for all pipelines and possibly water supply, sewerage, power and telecommunications, if feasible, to be positioned in the one location. Along with the Narrows crossing, this co-location will minimise potential acid sulfate soil problems, reduce significant harm to flora and fauna and allow for effective environmental management and monitoring. Engineering pre-feasibility of the bundled pipeline concept has been demonstrated by representatives from all four proponents. However **I require** that environmental assessment is provided on a final design that is proposed by all proponents in this bundled approach. **I have nominated** 1 September 2010 as the date by which this bundled crossing approach must be demonstrated, before **I will** entertain individual crossing solutions.

3. Disposal of dredge spoil—Laird Point

Regarding placement of dredged material, **I note** that the EIS proposes dredged material be transported to a placement facility to be constructed south of Laird Point on Curtis Island. **I also note** that dredged material placement at the Western Basin is proposed under a dredge management plan currently being developed by the Gladstone Ports Corporation, as part of the Western Basin Dredging and Disposal (WBDD) project and in accordance with the Western Basin Master Plan. The major channel dredging works required for the project are to be undertaken as part of the WBDD project. **I do not support** the proponent's alternative 'project-specific' plan and dredge placement facility south of Laird Point, as **I note** the site has been acquired by another LNG proponent.

4. Logistics in Gladstone and on the harbour

Pipe and associated material have been proposed to be transported through both the Port of Gladstone as well as Port Alma via sea from offshore mills and trucked to strategically placed lay down areas along the proposed pipeline corridor. **I have only accepted** the use of Gladstone port for pipe import if either a small amount of pipe is imported for local use, or the pipe is transported by rail out of Gladstone.

Although most workers will be located in Temporary Workers' Accommodation Facilities on Curtis Island, there will be daily transport across the harbour, and on land within Gladstone, of additional staff and all materials and equipment required for construction. There is therefore a need to develop a coherent logistics plan for the movement of these transport tasks, and for these to be integrated with those of other LNG projects. **I therefore require** the proponent to prepare a Gladstone Logistics Plan



together with the Gladstone Regional Council, the Port Authority and other proponents, and submit to me for approval.

A separate Harbour Management plan should also be developed with the Gladstone Harbour Master and Port Authority, to govern the movement of persons and materials across the harbour.

5. Impact of flare and plume on air space around Gladstone Airport

I am concerned about whether there might be limitations being placed on Gladstone Airport by plume from the LNG site. Given other LNG facilities are also planned for Curtis Island, **I need** to see a cumulative impact assessment on aviation airspace, and the adjustments to airspace which may be required, and whether this will affect Gladstone airport operations. **I require** the proponent to commit to an undertaking to ensure that a stack flare will not interfere unduly with the operation of air traffic and to participate in a detailed cumulative modelling study of plumes associated with the production of LNG and the impacts, if any, on airspace around Gladstone Airport and for formal agreement to be reached with CASA and GRC on limitations, if any.

6. Cumulative impacts of transport on roads

This proposal will require a considerable transport task for pipe and other materials haulage added to the central Queensland area road network. The emergence of multiple, overlapping proposals for LNG and other significant developments occurring concurrently or consecutively, is likely to result in significant cumulative impacts for communities and regions, including state and local road networks. **I have initiated** a proposal that requires all LNG proponents, in conjunction with DTMR, to contribute to a Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts and to implement the findings of this study.

7. Gasfield development locations of infrastructure and extent of disturbance of ecosystems

I require several reports to be provided to me, in order to ensure that appropriate strategies are in place that will govern major aspects of the gas field development, and to identify that they are in keeping with government policy on CSG development. These will include cumulative impacts, regional groundwater model, coal seam gas water management plan, a brine management strategy, an ecological constraints management strategy and more information on operational plans.

Further specification of operational plans showing positions and design of the gas field infrastructure, will be refined prior to petroleum activities taking place.

8. Strategies for management of gas field and CSG water

I am concerned about the significant amount of water and salt removed from coal seams over the life of the project, and the strategies to manage the use of these resources. There is the potential for ongoing risks to streams, soils and landscapes, through inappropriate use and disposal of CSG water, as well as the potential obligation on the Queensland Government to ensure actions it approves, do not increase downstream salinity in the Murray-Darling Basin. It is important for overall impact management that a clear set of strategies are in place for the project which consider the hierarchy of both preferred water uses and brine disposal strategies under government policies.

I require the proponent to submit a further CSG Water Management Plan and a Brine Management Plan, to address these strategies by aligning them with recently approved DERM Guidelines for approval of the beneficial uses of coal seam gas water.

I also require that a report on the cumulative impacts of multiple CSG gas field projects on water and ecological values be included in the reports which are provided to me as the gas field development is planned.

9. Construction management of third train of LNG facility

Regarding the third train, **I have been advised** by the proponent that a firm starting date for construction of this project is not available at present, and it will not be within the 5 year construction period of the first two trains. Therefore **I am unable to make a final determination** now on the start of construction of a project on Curtis Island which is beyond five years hence – namely the third train. However, **I state** that this Coordinator-General's report remains in force for four (4) years. If, prior to expiry of the standard 4 year period of currency of the Coordinator-General report, construction of Trains 1 and 2 has substantially commenced, and the proponent has decided to proceed with substantial commencement of Third Train construction within the following 2 year period, the proponent may apply to the Coordinator-General to extend the Coordinator-General report for the



further 2 year period if satisfactory contemporary social and logistics planning documents are provided to the Coordinator-General.

If a decision is made to construct the Third Train, but the Third Train is not substantially commenced within a 6 year period, the Coordinator-General Report lapses and a new declaration and environmental assessment will be required, whether or not the Coordinator-General has extended the currency of the Coordinator-General report.

10. Social impacts and presence of large workforce in regional communities

The Queensland Government has introduced a policy on the requirement for major industry projects to develop a social impact assessment (SIA) conforming with published guidelines. The SIA will include the social and cultural area, community engagement, a social baseline study, a workforce profile, potential impacts and mitigation measures and management strategies.

The SIA presented in the EIS has assessed the project's social impacts, the community engagement processes, the impacts including cumulative impacts from any existing projects on population, workforce, accommodation, housing, and use of community infrastructure and services.

I note that the proponent has indicated a commitment to develop and implement a social management plan to monitor social impacts associated with the project and work with local services and stakeholders to develop practical solutions

DIP however, has advised that the proponent's preliminary draft SIMP requires further work to achieve the high standard **I will require** for the project to demonstrate it has effectively dealt with the proposed social impacts and cumulative impacts identified during the EIS process.

I require that the proponent develop the SIMP in collaboration with stakeholders in accordance with the *Sustainable Resource Communities Policy 2008* and DIP draft SIMP guidelines.

I propose the establishment of an overarching Industry Leadership Group for CSG Resource Projects which would provide cross-project coordination in relation to the social and community cumulative effects of multiple LNG projects being developed simultaneously across the regions (Gas Fields, Pipeline and LNG plant).

In order to ensure that the cumulative impacts associated with this new emerging industry are adequately addressed and minimised, all new CSG resource projects will be required to establish, or participate in the new Industry Leadership Group for CSG Resource Projects.

I consider that a coordinated approach which promotes collaboration between the proponent, all levels of government and local communities is best to assist affected local communities to plan and fund the provision of the social infrastructure required to address future growth. **I am therefore** proposing a social infrastructure and service delivery strategy comprising four integrated elements. These integrated elements are:

1. Proponent's Commitments Register
2. GLNG Community Investment Program
3. The Social Infrastructure Strategic Plans (SISP) for Gladstone and Surat/Roma Regions
4. Specific contributions to manage social impact e.g. housing contributions.

For element 3, proponents can provide financial contributions to a special social infrastructure fund in which industry funds are pooled to (1) mitigate the impacts of major project developments in the respective regions; and (2) implement a priority social infrastructure schedule developed as part of the Social Infrastructure Strategic Plan for Gladstone Region (SISP-Gladstone); and a Social Infrastructure Strategic Plan for Roma and Surat regions (SISP- Roma and Surat).

For element 4, proponents or their construction contractors will be required to develop an *Integrated Project Housing Strategy* for the project in consultation with other major project proponents, Councils and the Department of Communities, within three months from the project commitment, and submit to the Coordinator-General for approval.



The purpose of the strategy is to initiate cooperative and coordinated approaches in consultation with other major project stakeholders and government agencies to resolve the cumulative housing impacts, with the outcome of achieving joint mitigation strategies, and delivery of housing solutions.

I agree that the large demand for workers required by the GLNG is likely to have an effect on the ability of other businesses in the area to attract and retain staff, particularly smaller businesses.

I therefore have asked the proponent to establish a Job Referral and Job Advertising Service for local businesses with similar trades/skills which require expanding or replacing staff and integrate it with the proponent's own recruitment service, such that applicants can choose from local or project employment prospects

11. Impacts on Australian Government matters

An assessment of the extent to which the material supplied (by the project proponent as part of the EIS process) addresses the relevant impacts (actual or likely impacts) on Matters of National Environmental Significance of each controlled action for the project, is provided in this report.

12. Offsets for ecological impacts

The proposal has analysed offsets for the LNG facility, pipeline, CSG gas fields, encompassing endangered and of concern regional ecosystems, fish habitat values, coastal and marine values on Curtis Island, essential habitat for rare and vulnerable plants and koalas, habitat for threatened species under NCA and EPBC and EPBC endangered ecological communities.

Hence it has assessed offset requirements under both under state policies and Australian Government EPBC offset policies.

The proponent has offered through Ecofund offset packages in accordance with Queensland and Australian Government policies using both 'traditional', being smaller scattered areas offsetting individual values on a case by case basis and a 'strategic approach', being larger, self-sustaining tracts of land.

I require that environmental offsets are to be secured by the proponent in a manner that achieves a "no net loss" of biodiversity outcome, and in a manner and timeframe acceptable to DERM. **I require** that an environmental offsets program, consistent with Queensland Government Environmental Offsets Policy (QGEOP) must be provided for approval before environmental authorities are issued.

I find a significant majority of the GLNG Gas Field development will occur in areas of remnant vegetation that have a "Not of Concern" Regional Ecosystem biodiversity status. Although these vegetation areas are not subject to offset requirements, the 'strategic approach' offsets package would consequently cover similar environmental values to those of "not of concern" ecosystems that may be disturbed. Thus the proposal to acquire a large area (as much as 1500 hectares) of Brigalow belt bioregion in one or two large parcels and up to 250 hectares of priority coastal land which is part of the southeast Queensland bioregion may be a suitable offset package. **I therefore require** that a package for the whole project be submitted for assessment at the time gas field development plans are being provided, and for the package to be regularly updated and reconciled with actual gas field development and other disturbance as it is undertaken.

13. Potential Resource Tax

The evaluation and consequent conditions are on the basis that there is currently no resource tax as recently announced by the Australian Government. If a tax is introduced and it is used to provide project infrastructure which has been required to be funded as a condition of approval, then the proponent may submit a request for project condition change.

14. Conclusion

I am satisfied that the EIS process conducted for the project adequately meets the requirements for impact assessment, to the greatest extent practicable, in accordance with the provisions of Part 4 of the SDPWO Act and Part 5 of the *State Development and Public Works Organisation Regulation 1999* (the Regulation), as specified in Schedule 1 (Item 2, Class 2) of the *Bilateral Agreement between the Australian Government and Queensland*.



A review of the extent to which the material supplied (by the project proponent as part of the EIS process) addresses the relevant impacts (actual or likely impacts) of each controlled action for the project under the *Environment Protection and Biodiversity Conservation Act*, (EPBC Act) on the matters protected by the each of the relevant controlling provisions, is provided in this report.

Conditions proposed in this report have been formulated in order to further manage impacts to social, environmental, transport, economic and workforce values through material change of use, environmental authority and Coordinator-General imposed conditions and other policy, regulatory and licence arrangements.

Therefore, **I recommend** that the GLNG project, as described in detail in the EIS and Supplementary EIS, and summarised in section 2 of this report, can proceed, subject to the recommendations and conditions contained in Appendices 1 to 4 of this report.

This report will be provided to the Australian Government Minister for the Environment, Heritage and the Arts pursuant to section 17(2) of the Regulation, to enable a decision on the controlled actions for the project pursuant to section 133 of the EPBC Act.

Colin Jensen
Coordinator-General

Date: 28 May 2010



1. Introduction

This report has been prepared pursuant to section 35 of the State Development and Public Works Organisation Act 1971 (Qld) (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) process for the Gladstone Liquefied Natural Gas project (GLNG). The EIS was conducted by the proponent, Santos Limited.

An initial advice statement was lodged with the Coordinator-General on 10 July 2007 and the project was declared to be a 'significant project for which an EIS is required', pursuant to section 26(1)(a) of the SDPWO Act, on 16 July 2007.

On 14 February 2008, Santos lodged five separate referrals to the Australian Government under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) to cover the project's components (CSG fields, pipeline, LNG terminal, marine/dredging and bridge). The Australian Government has declared all five referrals to be controlled actions and the Bilateral Agreement will be used for assessment.

The objective of this report is to summarise the key issues associated with the potential impacts of the project on the physical, social and economic environments at the local, regional, state and national levels. It is not intended to record all the matters which were identified and subsequently settled. Instead, it concentrates on the substantive issues identified during the EIS process.

This report represents the end of the Queensland Government significant project impact assessment process. Essentially, it is an evaluation of the project based on information contained in the EIS, submissions made on the EIS and information and advice from advisory agencies and other parties. The report also contains an evaluation of the SEIS, submissions made on the SEIS and information and advice from advisory agencies and other parties. The report also states conditions under which the project may proceed.



2. Project description

2.1 The proponent

The project proponent is an unincorporated joint venture between Santos and PETRONAS. Santos and PETRONAS respectively have a 60 per cent and 40 per cent participating interest in the project.

Santos is an Australian oil and gas exploration and production company with CSG interests in Queensland. Santos also has interests and operations in all major Australian petroleum provinces and in Indonesia, Papua New Guinea, Vietnam, India, Bangladesh, Kyrgyzstan and Egypt. Santos is a large Australian onshore domestic gas producer, supplying sales gas to Queensland and all other mainland Australian states and territories, ethane to Sydney, and oil and other liquids to domestic and international customers. Santos has a market capitalisation which puts it within Australia's top 20 companies. Significant development projects contributing to the growth of Santos include the following:

- CSG exploration and developments in Queensland
- Bayu-Undan Liquids and Darwin LNG projects in the Timor/Bonaparte Basin area offshore of Darwin
- Mutineer-Exeter oil fields and John Brookes gas field developments in the Carnarvon Basin offshore Western Australia
- Casino gas development in offshore Victoria
- Oyong oil and gas field and Maleo gas field in offshore East Java.

PETRONAS is the acronym for Petroliaam Nasional Berhad, a leading Malaysian based oil and gas multinational company. PETRONAS is a fully-integrated oil and gas corporation and is ranked among FORTUNE Global 500's largest corporations in the world. PETRONAS has four subsidiaries listed on the Bursa Malaysia (Kuala Lumpur Stock Exchange) and has projects and operations globally in more than 30 countries worldwide. On an equity basis, PETRONAS is the largest LNG producer in Asia and is the third largest in the world. The company operates the PETRONAS LNG complex in Bintulu, Sarawak, which is the world's largest integrated LNG facility with a total capacity of approximately 23 million tonnes per annum (Mtpa) from 8 LNG trains. PETRONAS is also a partner in the ELNG Project in Egypt and in the Dragon LNG Project in Wales. It is the world's largest single owner - operator of LNG ships and has long standing relationships with an extensive base of high volume LNG customers in Asia.

2.2 Project components

The GLNG Project proposed the following components:

- production of approximately 5 300 petajoules (PJ) (140 billion m³) of gas from the CSG fields which is sufficient gas to supply at least the first stage of the LNG facility. This will involve the development of approximately 2 650 exploration and production wells. It is anticipated that up to 1 200 wells will be established prior to 2015, with potential for up to 1 450 or more additional wells over a 20 year period after 2015. Additional supporting infrastructure including field gathering lines, nodal compressor stations, centralised gas compression and water treatment facilities, accommodation facilities, power generation and water management facilities will also be installed.
- a 435 km long gas transmission pipeline for the delivery of the gas from the CSG fields to the LNG facility. Proposed pipeline capacity is sufficient to supply three trains of the LNG facility.

- an LNG facility on Curtis Island at full development capacity of approximately 10 Mtpa. The LNG facility is proposed to be developed in three stages (called trains), the first of which will have a capacity of approximately 3 Mtpa. The LNG facility will consist of the following key elements:
 - a liquefaction facility which includes the on-shore gas liquefaction and storage facilities
 - marine facilities which will include a product loading facility (PLF) for loading LNG into ships for export, and a materials offloading facility (MOF) and a haul road for the delivery of workers, equipment, plant and materials to the LNG facility site
 - a swing basin and an access channel from the existing Targinie Channel in Port Curtis
 - a dredge material placement facility initially proposed in the EIS to be at Laird Point; but subsequently being considered with a combined industry proposal under the Western Basin Dredging and Disposal Project
 - a 2 000 person capacity¹ accommodation facility on Curtis Island for construction workers was initially included in the EIS for train 1. Further calculations for both trains 1 and 2 indicates around 2 700-2 800² workers at peak³ is preferred, with a commensurate increase in the Curtis Island accommodation capacity. Access to the LNG facility from the mainland was proposed to occur by either of the following options:
 - the provision of road access to Curtis Island by way of a potential access road and bridge from the mainland crossing Port Curtis between Friend Point and Laird Point. Construction phase access to the site for at least Train 1 will be by barge and ferry as the access road and bridge will not be constructed by that time; or
 - access to the site by barge and ferry for the life of the GLNG Project (for both construction and operation) if the access road and bridge is not constructed.

Since the EIS and SEIS proposals have been submitted and considered, the proponent has indicated it will use the barge and ferry option for the entire project, as the significant investment in the bridge could not be justified when it would not be ready in time for construction of the first train.

CSG quantities beyond 5 300 PJ are required for the second and third trains of the LNG facility, and are likely to be supplied from a combination of the wells referred to above, further development of the Santos operated CSG fields, by utilising Santos' share of gas from fields in which Santos has an interest but is not the operator, and/or from third parties.

The precise sources of gas for the second and third stages of the LNG facility cannot be fully determined at present as it will depend on future exploration activities and development plans. A desktop assessment of the existing environment of the Santos related fields for the second and third stages of the LNG facility has been included in this EIS. It is expected that further environmental assessment and approval processes beyond those considered in this EIS will be required for the extraction of the additional CSG depending on the arrangements made for sourcing of the gas.

2.3 Project rationale

2.3.1 Primary aims of the project

The GLNG Project aims to commercialise Santos' Queensland CSG resource. Santos states that it would protect environmental values; manage environmental, health and safety requirements; implementing best

¹ Note that this capacity was based in the EIS on a peak LNG construction workforce of 3000 using the stick-build construction option, but a Pre-assembled Module (PAM) construction method is preferred.

² Train 2 is unlikely to result in any further local employment over and above the additional 600 workers, due to the likelihood of a local employment saturation. Because of this local shortage, extra fly-in workers will be needed.

³ Represents a peak of workers for the overlapping construction of Trains 1 and 2 assuming Train 2 commences 12 months after the commencement of Train 1. The peak comes between months 30 and 40 and lasts approximately 12 months.



environmental practice; and provide employment opportunities in Queensland throughout all phases of the project. To meet this objective, Santos would adhere to its sustainability framework for the design and implementation of the project. This would be achieved through Santos' company-wide environment, health and safety management system (EHSMS) which provides a structured framework for effective environmental and safety practice across all of Santos activities and operations. The framework would also enable better business decisions through a deeper understanding of their impacts on people, communities, economics and the environment.

The economic benefits resulting from the project are expected to have regional, state and national dimensions. It would contribute substantial, positive economic benefits to Queensland and Australia derived from the combination of: the export income the project produces; tax and royalty revenues paid by the upstream producers; businesses and individuals employed; the money spent in the local economy, and the incentive for accelerated exploration and reserve booking of the state's extensive CSG resources.

The project is anticipated by Santos to generate major net economic benefits for the Queensland economy and the wider Australian economy. In summary, the impact on the Queensland economy of the 10 Mtpa project is estimated to be:

- Over the period 2009 to 2033, Queensland's real gross state product (GSP) will on average be \$4.1 billion or one percent higher each year than in the base case scenario. In the period after 2022, when the project has reached production of 10 Mtpa, real GSP will be almost \$6.4 billion or 1.4 per cent higher than in the base case scenario.
- This increase in Queensland's real GSP is distributed to households throughout Australia, although Queenslanders benefit proportionately more than other Australians. The project contributes to a net average annual increase in Queensland real private consumption spending over the period 2010 to 2033 of \$540 million. This constitutes a 0.2 per cent increase over the base case scenario, which is significantly higher than the gain for Australia as a whole (of 0.1 percent). In the period after 2022, the net average annual increase in real private consumption spending is almost \$1 billion a year (0.4 percent) higher than it would be otherwise.
- The project delivers important employment benefits to the Queensland economy and the project regions. On average, additional employment in Queensland is 4 300 per year on a full-time equivalent basis. This exceeds the average annual employment of the project (the direct employment effect) across both the construction and operations phases of 3 196, demonstrating a significant employment multiplier effect. The employment effect is stronger after 2022, averaging almost 5 000 additional jobs per year.

The regional economies in which the project is located, on a per capita basis, are anticipated to benefit to a greater extent from the project than the wider Queensland and Australian economies. Regional residents can be expected to benefit from increased employment opportunities and opportunities to supply the project with goods and services. Given the relative size of the regional economies, project expenditures in the local region would be significant.

3. Impact assessment process

DIP coordinated the impact assessment process for this project on behalf of the Coordinator-General in accordance with the SDPWO Act.

3.1 Significant project declaration and controlled action

An initial advice statement (IAS) was lodged with the Coordinator-General on 10 July 2007 and the project was declared to be a 'significant project for which an EIS is required', pursuant to section 26(1)(a) of the SDPWO Act on 16 July 2007.

The impact assessment process under the SDPWO Act is also the subject of a bilateral agreement between the Queensland and Australian Governments in relation to environmental assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 14 February 2008 the proponent referred the project to the Australian Government Minister for the Environment, Heritage and the Arts under the EPBC Act as five EPBC Act referrals addressing the following:

- CSG fields development (referral reference number 2008/4059)
- Gas Pipeline corridor (referral reference number 2008/4096)
- LNG Terminal (referral reference number 2008/4057)
- Bridge and Road (referral reference number 2008/4060)
- Marine Facilities (referral reference number 2008/4058).

The Minister subsequently determined that each of the five components of the project was a controlled action and the Bilateral Agreement will be used for assessment. The following relevant controlling provisions were noted for some or all of the components:

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

Consequently, an approval for the project is required under Part 9 of the EPBC Act following the conclusion of the Queensland assessment process.

3.2 Review and refinement of the EIS terms of reference

On 24 May 2008 representatives of state agencies and local governments were invited to act as advisory agencies for the EIS process. These included:

- Department of Communities
- Department of Community Safety
- Department of Employment, Economic Development and Industry
- Department of Environment and Resource Management
- Department of Education and Training
- Department of Infrastructure and Planning
- Department of Premier and Cabinet
- Department of Transport and Main Roads



- Queensland Treasury
- Queensland Health
- Queensland Police
- Department of Justice and Attorney-General
- Gladstone Regional Council
- Western Downs Regional Council
- Maranoa Regional Council
- Banana Shire Council

The draft terms of reference (TOR) were advertised for public and advisory agency comment on 24 May 2008 in The Australian and The Courier-Mail and regional newspapers inviting submissions until 20 June 2008.

Advisory agency briefings were held in Brisbane on 10 June 2008.

A total of 32 submissions were received by DIP with 19 from advisory agencies and 13 from the general public, commercial operations and environmental non-government organisations. The final TOR were approved by the Coordinator-General on 20 August 2008.

3.3 Public review of the EIS

The initial draft of the EIS was provided by the proponent on 30 March 2008. The final EIS was provided to DIP on 10 June 2009.

The EIS was approved by the Coordinator-General for release and publicly advertised on 20 June 2009 in The Australian, The Courier Mail, the Rockhampton Morning Bulletin and the Gladstone Observer, on the 25 June 2009 in the Surat Basin News and on the 26 June 2009 in the Roma Western Star, Dalby Herald and Biloela Central Telegraph, allowing eight weeks for consultation, concluding on Monday 17 August 2009.

Advisory agency briefings were held in Gladstone on 23 July 2009 and in Brisbane on 17 July 2009.

The EIS was available from the proponent free of charge. The IAS, TOR and EIS executive summary were made publicly available on the DIP website and also on the Santos GLNG website.

The EIS was displayed at the:

- Roma Regional Council Office
- Dalby Regional Council Office
- Banana Shire Council Office
- Gladstone Regional Council Office
- Santos Ltd Offices, Gladstone, Brisbane, and Roma
- State Library of Queensland, Brisbane

Some 42 submissions were received by DIP with 20 from advisory agencies and 22 from the general public, commercial operations and environmental non-government organisations. These were recorded by DIP and provided to Santos for appropriate consideration and response. Submissions were received from:

Advisory Agencies

- Department of Communities
- Department of Infrastructure and Planning—Rockhampton
- Department of Infrastructure and Planning—Brisbane Office
- Department of Community Safety
- Department of Environment and Resource Management
- Queensland Health
- Department of Employment, Economic Development and Industry (Queensland Mines and Energy)
- Department of Employment, Economic Development and Industry—Indigenous Initiatives

- Department of Employment, Economic Development and Industry (Queensland Primary Industries and Fisheries)
- Department of Main Roads and Transport
- Queensland Police
- Queensland Treasury
- Western Downs Regional Council
- Gladstone Regional Council
- Central Highlands Regional Council
- Banana Shire Council
- Gladstone Area Water Board
- Maranoa Regional Council
- Gladstone Ports Corporation
- Australian Government Department of Environment, Water, Heritage and the Arts.

General public

- Wildlife Queensland
- Port Curtis Coral Coast Aboriginal Corporation
- Callide Valley Landcare Group
- Fitzroy Basin Association
- Wildlife Preservation Society of Queensland
- World Wildlife Fund Australia
- QGC Limited
- Capricorn Conservation Council
- Fodder King
- Queensland Energy Resources Ltd
- 12 private submissions

Two major issues that required guidance from the Department were:-

- The disposal of dredging spoil, which is the subject of a separate project – the Port of Gladstone Western Basin Dredging Project
- The location of the accommodation for construction workers for the new projects on Curtis Island.

Other significant issues which have been raised by agencies and local councils include:-

- Potential impact on coastal wetlands and marine ecology from pipeline and possible road, bridge access across the Narrows and Kangaroo Island wetlands
- Harbour traffic generally, and specific congestion issues for materials and workforce transport at Auckland Point and proposed new port arrangements at Port Alma, for Calliope River, Fishermans Landing and the RG Tanna Coal Terminal in Gladstone harbour
- Transport impacts of imported gas pipes from a suitable port and for distribution throughout the pipeline route
- Pipeline corridor route, through sensitive environments, the GSDA and across the shale oil deposit at Targinie
- Management of associated water produced from coal seam gas extraction, and its impact on soils, surface water and groundwater.



3.4 Review of Supplementary EIS

Following the receipt and analysis of submissions made on the EIS, it was determined by the Coordinator-General that a supplementary report on the EIS (SEIS) was required.

Santos submitted the SEIS to DIP on 10 December 2009. The Deputy Coordinator-General approved the SEIS be issued for review to those advisory agencies and general public submitters who had raised issues on the EIS which were then addressed in the SEIS. Comments were invited from 16 December 2009 until 1 February 2010.

Twenty-one submissions were received by DIP on the SEIS. Wherever substantive issues required technical resolution, Santos provided a written response to the SEIS submission.

Advisory agencies were then requested to provide confirmation in writing acknowledging that their issues had been satisfactorily addressed by Santos or alternatively by providing possible recommendations and/or conditions that might allow the project to proceed.

4. Project approvals and legislative framework

4.1 Major project approvals

This report is the culmination of the assessment phase of the EIS pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). It takes into account the EIS and the SEIS, all properly made submissions and other submissions accepted by me, and other material which I **consider** relevant to the project, such as comments from advisory agencies and technical reports on specific components of the project.

The impact assessment process under the SDPWO Act is also the subject of a bilateral agreement between the Queensland and Australian Governments in relation to environmental assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Australian Government Minister for the Environment, Heritage and the Arts determined that five EPBC referrals are controlled actions and should address the following:

- CSG fields development
- Gas pipeline corridor
- LNG Facility
- Bridge and road (which is not proceeding in the current project)
- Marine facilities (of which dredging is being assessed under the Western Basin Dredging and Disposal project).

Approval for the project is required under Part 9 of the EPBC Act following the conclusion of the Queensland assessment process.

In addition to the requirements under the SDPWO Act and the EPBC Act, the GLNG project will require environmental authorities under the *Environmental Protection Act 1994* (EP Act), petroleum authorities under the *Petroleum and Gas (Production and Safety) Act 2004*, development approvals under the Gladstone State Development Area Development Scheme (made under the SDPWO Act), and development approvals under the *Sustainable Planning Act 1997* (SPA).

Under divisions 6 and 6A of the SDPWO Act, the Coordinator-General report may state conditions for the environmental authority and /or any petroleum lease, pipeline licence or petroleum facility licence required for the project.

Under section 39 of the SWPDO Act, the Coordinator-General report sets out for the SPA Assessment Manager:

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

The main approvals required for commencement of project activities are shown in Table 1.



Table 4.1—Relevant component of the project scope 2010 to 2014

Legislation	Approval of relevant component	Approval agency
Pipeline		
<i>Environmental Protection Act 1994</i> (section 426A)	Environmental Authority	DERM - EPA
<i>Petroleum and Gas (Production and Safety) s409/s/339/s497</i>	Petroleum Pipeline Licence – onshore	DEEDI – Mines and Energy (M and E)
<i>SDPWO Act 1971</i> (s84 (SDPWO) cl.9.1.Sc.7 (GSDA))	Development permit for a material change of use GSDA	DIP
<i>SDPWO Act 1971</i> (s84 CICSDA cl.9.1.Sc.7 (GSDA))	Development permit for a material change of use CICSDA	DIP
<i>SDPWO Act 1971</i> (s84 (SDPWO) GSDACIIP cl.9.1.Sc.7 (GSDA))	Development permit for a material change of use GSDACIIP	DIP
Plant		
<i>Petroleum and Gas (Production and Safety) Act 2004</i> (PGPSA)(s445)	Petroleum Facility Licence	DEEDI – M and E
<i>SDPWO Act 1971</i> (s84 (SDPWO) GSDA - CIIP cl.9.1.Sc7 (GSDA))	Development permit for a material change of use – GSDA High impact	DIP
<i>Dangerous Goods Safety Management Act 2001</i> (s36) Dangerous Goods Safety Management Regulation 2001	Notification of a Major Hazard Facility	JAG - HICB
<i>Dangerous Goods Safety Management Act 2001</i> (s47) PGPSA(s674)	Submission of Safety Report	JAG - HICB
Marine Facilities		
<i>SDPWO Act 1971</i> s84 9SDPWO) GSDA cl.9.1.Sc.7 (GSDA)	Development permit for a material change of use – GSDA	DIP
<i>Environment Protection Act 1994</i>	Environmental authority – Marine Facility	DERM-EPA
<i>Environment Protection Act 1994 (Qld)</i> <i>Sustainable Planning Act 2009 (Qld)</i>	Development permit for a material change of use for an environmentally relevant activity other than a petroleum activity.	Relevant Council
Gas Fields		
<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth) Controlled Actions. Approval to take a “Controlled Action (section 68 and 133) 2008/4059 CSG fields 2008/4096 Pipeline 2008/4057 LNG Facility 2008/4060 Bridge 2008/4058 Marine	Application made (by way of referral) to the Department of Environment, Water Heritage and the Arts – completed	Australian Government Minister for Environment, Heritage and the Arts
<i>Environmental Protection Act 1994 (Qld)</i> <i>Environmental Protection Regulation 1998</i> Environmental Authority (s426, reg 23 and schedule 5 Regulation)	All activities on Project Area PLs – Fairview EA	DERM
<i>Petroleum and Gas (Production and Safety) Act 2004</i> (Qld) <i>Petroleum and Gas (Production and Safety) Regulation 2004</i> (Qld). A pipeline licence is required to construct a pipeline outside PL	CRWP Extension to CS1 – 20km – Fairview PL	DEEDI
<i>Environmental Protection Act 1994</i> (Qld) <i>Environmental Protection Regulation 1998</i> (Environmental Authority (s426, reg 23 and schedule 5 Regulation)	Roma EA	DERM

Legislation	Approval of relevant component	Approval agency
<i>Petroleum and Gas (Production and Safety) Act 2004 (Qld)</i> . The Minister's grant of a 2004 Act PL to replace a 1923 Act PL, to allow storage of gas in natural underground reservoirs (s908).	Gas Storage – H/G Reservoir Applies to tenements in the Roma Area	DEEDI
<i>Petroleum and Gas (Production and Safety) Act 2004 (Qld)</i> Petroleum and Gas (Production and Safety) regulation 2004 (Qld) A pipeline licence is required to construct a pipeline outside the PL	S3 and S1 Hub to Roma CRWP and related RUGS infrastructure	DEEDI
<i>Petroleum and Gas (Production and Safety) Act 2004 (Qld)</i> Petroleum and Gas (Production and Safety) Regulation 2004 (Qld) A pipeline licence is required to construct a pipeline outside the PL. Require amendment of PPL118 for CRWP to allow second pipeline	CRWP looping PPL118 Fairview	DEEDI
<i>Environmental Protection Act 1994 (Qld)</i> Environmental Protection Regulation 1998 (Qld) Environmental authority Amendment (s426, reg 23 and Schedule 5 Regulation). Amendment of PPL118EA	CRWP Looping	DERM
<i>Sustainable Planning Act 2009 (Qld)</i> Development Permit for a Material Change of Use assessable under a Planning Scheme	Irrigation facilities – MCU	Local Government
<i>Sustainable Planning Act 2009 (Qld)</i> Development Permit for a Material Change of Use assessable under a Planning Scheme	RO Plant MCU	Local Government
<i>Petroleum and Gas (Production and Safety) Act 2004 (Qld)</i> Petroleum and Gas (Production and Safety) Regulation 2004 (Qld) A petroleum facility licence is required to construct a petroleum facility (ie a facility for the distillation, processing, refinery, storage and transport of petroleum)	Petroleum Facility Licence	DEEDI
<i>Environmental Protection Act 1994</i> Beneficial reuse of associated water. CSG water is a regulated waster under the EP Act. The tenure holder will then require either a beneficial use approval or an environmental authority that specifically provides for the disposal of the waste under the EP Act. Environmental Protection (Water Management) Regulation 2000 Approval of a resource or type of resource for a beneficial use (Section 66B of the Environmental Protection (Waste Management) Regulation 2000 <i>Water Act 2000</i> To supply CSG water for another purpose (for example water supply or an environmentally relevant activity) the proponent must also obtain a water licence under the Water Act 2000(Chapter 2, part 6)	Environmental Authority – Fairview, Roma and Arcadia Valley Approval of a resource or type of resource for a beneficial use Water Licence	DERM



5. Key findings and environmental management plans

5.1 Key findings

Section 17 of the GLNG EIS and SEIS identified the key findings as:

- associated water from the CSG field development and gas transmission pipeline construction can be managed by adopting a risk management approach to water treatment and reuse
- land use disturbance from the CSG field development and gas transmission pipeline construction will be managed by minimising the area required for field development and progressive rehabilitation of disturbed areas at the completion of activities
- air, water and noise emissions from the LNG facility will be controlled so that regulatory limits and guidelines are complied with
- social and community impacts from the construction workforce for the LNG facility will be managed by accommodating most of the workforce on Curtis Island in a self-contained construction accommodation facility
- dredging impacts will be limited to the immediate area of the dredging operation and will be conducted in a manner similar to that applicable to other dredging activities in Port Curtis
- offsets will be offered for flora and fauna disturbance in accordance with Queensland and Australian Government policies.

The EIS found that during its staged development, which incorporated a comprehensive hazard and risk assessment approach, most of the hazards would not result in an off-site impact given the design parameters that were established for the project.

The EIS described the technical studies and community consultation undertaken. The project's environmental, social and economic impacts were identified by assessing the project description against the existing environmental baseline and identified environmental values. Where possible, impacts were assessed according to their conformance with relevant state or national guidelines and standards. Likely environmental harm to the environmental values of the project area were considered to have been identified.

The EIS assessment reported that it did not identify any significant detrimental environmental impacts that could not be mitigated to acceptable levels.

The EIS found that the impacts from the project's development could be mitigated through appropriate design and the residual impacts could be largely managed through the implementation of suitable environmental management strategies outlined in the project's environmental management plans.

5.2 Environmental Management Plans (EMP)

5.2.1 Coal Seam Gas Field EMP

The preliminary CSG fields EMP contains both construction and operational elements. The following construction and operational management elements have been incorporated into the EMP:

- Planning and Approval Processes
- Seismic and Geophysical Survey
- Corehole and Exploration Drilling
- Pilot Testing (Appraisal Wells)
- Production Wells and Gas Processing Facilities
- Gas and Water Gathering System
- Clearing and Grading
- Trenching
- Hydrotesting
- Rehabilitation
- Associated Water Management
- Access
- Flora and Fauna Management
- Mosquito Management
- Weed Management Plan
- Groundwater Management
- Surface Water Management
- Land Contamination
- Waste Management
- Chemical and Dangerous Goods Management
- Noise and Vibration
- Air Quality
- Greenhouse Gas
- Cultural Heritage
- Social and Community
- Emergency Response
- Incidents and Complaints
- Decommissioning.

5.2.2 Gas Transmission Pipeline EMP

The gas transmission pipeline EMP consists of construction and operational elements.



Construction activities

The construction elements of the EMP consist of:

- Access
- Clearing and grading
- Pipe stringing and welding
- Trenching
- Pipe laying and backfilling
- Hydrotesting
- Rehabilitation
- Flora and fauna management
- Weed management
- Water management
- Soil management
- Waste management
- Chemical and dangerous goods management
- Noise and vibration
- Air quality
- Transport and traffic management
- Cultural heritage
- Third party infrastructure
- Emergency response
- Incidents and complaints.

Operational activities

Prior to commencement of operations, the EMP will be reviewed and updated to:

- Include the organisational structure for operations and allocation of responsibilities in line with the organisational structure;
- Establish reporting structures based on the organisational structure
- Include relevant approval conditions arising from the approval process and subsequent permits, authorities and licences relevant to the pipeline's operation
- Review control strategies, objectives and performance indicators to ensure that these are appropriate for operations
- Include reference to "as constructed" drawings, particularly those that reference areas of environmental sensitivity
- Review inspection and audit schedules and inclusion of specific locations where a higher level of inspection is required (e.g. to monitor rehabilitation success of sensitive areas).

The key operational activities that may have an impact on environmental values are:

- Access to the right of way (ROW)
- Maintenance of the ROW, involving management and/or control of vegetation, weeds, pests, bushfire, erosion and sedimentation, pipeline subsidence, cultural heritage and third party infrastructure/landuse

- Maintenance of the pipeline, including excavation, hydrotesting, pigging, and welding. Where maintenance activities to be undertaken are similar to construction activities, the activity-based management plans presented in the construction EMP will apply
- Operation of the pipeline involving management of leaks and emergency response
- Monitoring activities including patrols, inspections, marine and aerial surveys.

5.2.3 LNG Facility EMP

LNG Facility Environmental Management Plan Overview

The preliminary LNG facility EMP contains both construction and operational elements. The following construction and operational management elements have been incorporated into the EMP:

- Clearing and Grading
- Flora
- Fauna
- Mosquito
- Groundwater
- Surface Water
- Land Contamination
- Acid Sulfate Soils
- Waste
- Chemical and Dangerous Goods
- Noise and Vibration
- Air Quality
- Cultural Heritage
- Health and Safety
- Emergency Response
- Incidents and Complaints
- Decommissioning.



6 General issues

6.1 Transport

6.1.1 Pipe transport

A significant transport issue associated with the construction of the gas transmission pipeline is the transport of pipe to the construction corridor.

A) Gladstone

The transport task

The EIS outlined that pipe and associated materials for the gas transmission pipeline would be transported to the Port of Gladstone via sea from offshore mills, and trucked by road to strategically placed laydown areas along the proposed corridor. The base case assessed in the EIS was that pipe would be shipped to Gladstone at Auckland Point Wharves (Port Central) and trucked to seven laydown locations.

Approximately 37,000 pipe sections (pipe joints) will be required for the 435 km pipeline. Trucks used for pipeline delivery will most likely be extendable semi-trailers and the pipes are likely to be transported in lengths of 12 - 15 metres. Trucks are estimated to have a load capacity of three pipes, equating to approximately 12,333 truck loads, or 24,666 truck trips added to the road network. Ships are estimated to carry approximately 6,000 pipe lengths, at an estimated delivery rate of one ship per month. This equates to approximately 67 truck loads (134 truck movements) per day (Monday to Friday) for pipe haulage.

Stakeholder issues

DTMR expressed concerns about GLNG operating all the pipeline transport requirements out of Gladstone due to:

- the volume of the transport task (possibly up to 60 to 70 daily heavy vehicle movements over a twelve month period); and
- concerns from Gladstone stakeholders.

GRC also raised concerns about the number of trucks passing through Gladstone and also noise associated with unloading the pipes from the vessel onto the laydown area at Auckland Point and then reloading onto trucks.

Proponent's response

An alternative option was also assessed to transport pipe by rail from Gladstone and or Brisbane to the laydown areas. Transportation of materials (e.g. pipe) by rail has been assessed where available (and discussed in EIS Section 4.5.2 and Appendix J). However in the SEIS GLNG advised that Queensland Rail may not have capacity to transport materials from Brisbane to Roma due to limitations in rail infrastructure that include a single line up the Toowoomba range and limited rolling stock and locomotives. The existing infrastructure is fully committed to hauling existing cargo such as coal and grain resources. The SEIS also alludes that QR may not have sufficient rolling stock, rail network capacity and infrastructure to service the GLNG project out of Gladstone.

Should suitable rail capacity become available in the future GLNG will consider its use.

B) Port Alma

The transport task

In the SEIS Port Alma was proposed for use as an alternative port facility and transport route to import materials (including larger cargo such as compression kits and engines, pipes and bends) to minimise pressure on Gladstone Port, the traffic flows in Gladstone and the impact on the Gladstone community.

Port Alma is the deep sea port for Rockhampton and provides both import and export facilities and services. It currently is used for the import of ammonium nitrate, tallow, explosives, and general and break bulk cargoes. It is situated approximately 60 km from Rockhampton.

Existing facilities at the port include:

- three docks
- an undeveloped 67 hectare port owned stockpile area (laydown area) on the Bajool - Port Alma Road approximately 20 km from the port
- two container yards and a bulk store of 540 m²
- stevedoring capacity
- dockside crane of 25 ton capacity.

The port's draft is 7 m on low tide and 10 m on high tide. There are no rail facilities adjacent to the port. No dredging is required for the use of the port for the GLNG project.

Stakeholder issues

GPC advises that Port Alma has no established laydown area at the port. This option has been assessed on the basis that, with the agreement of Gladstone Ports Corporation (GPC), GLNG will have access to a parcel of land (Lot 96) owned by GPC located on the Bajool-Port Alma Road, approximately 20 km west of Port Alma and 6 km east of Bajool. Lot 96 covers a total area of 67 ha, approximately 7 ha of which has been used as a storage site for various projects in the past. The site has been fenced at the front. The site is devoid, to a large extent, of vegetation (remnant or regrowth). It has been previously covered with a gravel hardstand base which is now in a state of disrepair and interspersed with various grasses. Minor construction works will need to be completed on the laydown area, including hardstand and temporary office facilities.

Proponent's response

An assessment of the impacts associated with the Port Alma option has been undertaken and is provided in Attachment H of the SEIS. In summary the report concluded that no new port construction was necessary to accommodate pipe discharge, noise impacts from unloading would not be an issue due to the distance of the port to sensitive receptors and the laydown area on Lot 96 is currently vacant and would only require minor grading. However the report did conclude that the Bajool-Port Alma road will require upgrading and that the extent of any contribution to be made by GLNG is a matter for discussion and resolution between GLNG, DTMR, GPC, local authorities and the Coordinator-General.

Other ports

The EIS and the SEIS did not allude to any other ports that GLNG were considering to use for the discharge of pipes, although reference was made to the use of rail to transport pipe to the corridor from the Port of Brisbane.

Coordinator-General's conclusion

I consider that it is acceptable that the final arrangements to transport pipe to the pipeline corridor be resolved subsequent to the EIS process. However **I am concerned** about the impacts on roads and also



on the Gladstone community. Therefore I set two conditions regarding arrangements for any proposed Port Alma pipe discharge and a requirement for use of rail if pipes are brought in via Gladstone. I bring this condition to the attention of the relevant agencies (DTMR, Gladstone Ports Corporation, Gladstone Regional Council, Rockhampton Regional Council) responsible for any subsequent approvals required for pipe transport. These conditions appear in Appendix 1 Part 2 Conditions 1 and 2.

If the proponent determines that for either environmental or commercial reasons, it is expedient to utilise another port other than Gladstone or Port Alma to discharge pipe or other materials, then I require a thorough transport and road impact study on the alternative port location. This condition is presented in Appendix 1 Part 2 Condition 3.

6.1.2 Material and personnel transport

Operational transport (shipping)

As described in Section's 3.3.3 and 3.9 of the EIS, the LNG will be stored and transported as a non-pressurised liquid in ships specifically designed to transport LNG. LNG carriers (LNGC) are double-hulled ships and are specially designed to prevent leakage or rupture. For the 3 - 4 Mtpa Train 1 LNG facility (assuming 155,000 m³ capacity ships), there will be approximately 50 ship loads of LNG exported each year, or about one ship per week. This rate will increase to 160 ships per year or about one ship every 2 days when the three trains have been constructed and the production rate increases to 10 Mtpa. Using larger ships will involve correspondingly fewer ship movements but checks would be required to determine if sufficient draft is available to accommodate larger vessels. It is intended that the LNGCs will be chartered by third parties.

These ships will navigate through the Great Barrier Reef Marine Park within the designated shipping area before entering the Port of Gladstone, and again navigate through the Great Barrier Reef Marine Park Shipping Area when leaving the Port of Gladstone.

The level of shipping through the designated shipping channels is approximately 2,000 ship movements per year. The typical ships using these channels carry products like coal, sugar, iron ore and oil.

The LNGC will represent an increase of 5 per cent in shipping movements for the first LNG train rising to an increase of ship movements of 16 per cent for three LNG trains.

It is also recognised that the LNGC's may use shipping channels which are beyond the eastern boundary of the Marine Park, therefore avoiding potential impacts on the Marine Park.

Construction transport

In the EIS it was proposed that material and equipment would be barged to Curtis Island from Auckland Point. Most of the imported equipment (approximately 80 per cent) such as PAM's and other oversized construction items was to be unloaded directly from export vessels at the materials offloading facility (MOF) located adjacent to the LNG facility on Curtis Island. The balance of the imported equipment was to be unloaded at Auckland Point (Port Central) and stored in a secured laydown area adjacent to the wharf. It was then to be loaded onto contracted barges for transfer to the MOF.

In regards to personnel movements the EIS proposed that all workforce ferries would also leave from Auckland Point (Port Central).

Since the release of the EIS further transport and logistic strategies have been developed by GLNG, including the development of additional locations for loading/unloading facilities. This includes the construction and operation of additional mainland marine facilities, which will reduce the amount of traffic generated from Auckland Point (Port Central). Material loading/unloading facilities at Fisherman's Landing (temporary only), the south bank of the Calliope River and potentially adjacent to the existing RG Tanna site are proposed, in addition to the proposed Port Central site, which will be predominantly used for the transport of personnel.

This strategy is aimed at separating personnel movements from material (including pipe) movements. These additional locations will significantly reduce the quantity of materials proposed for transfer through Auckland Point (Port Central), move the transfer of bulk materials and heavy equipment to alternative locations, and address concerns raised about the traffic and social impacts within the central Gladstone area.

The revised strategy has proposed that for an initial six month period, material and equipment would depart from Fisherman's Landing and personnel from the existing Gladstone Marina to Curtis Island. This initial period is characterised by lower construction traffic volumes and reduced personnel numbers compared to subsequent periods, and allows time for development of long-term construction facilities.

During this initial six month period, it is proposed that long-term construction facilities will be constructed on the south bank of the Calliope River (bulk materials and equipment) or alternatively behind the RG Tanna loading berths (bulk materials and equipment), with the final location subject to ongoing stakeholder engagement. Long-term construction facilities for personnel and some materials would also be developed at Auckland Point (Port Central) as was anticipated in the EIS, with reduced material transfers from this location inherent in the new strategy.

It is anticipated that at peak construction periods, around 62 per cent of construction workers for the LNG facility will be accommodated on Curtis Island during their shifts of 10 days on and 4 days off roster and transported by ferry from the Port Central Facilities. The remaining 38 per cent would be accommodated around the Gladstone area and ferried to/from Curtis Island daily.

If the Curtis Island access road and bridge are not constructed, barge/ferry services will continue to transport personnel to Curtis Island during ongoing construction and operations of the LNG facility.

A separate assessment of the loading/unloading facilities has been undertaken and is provided in Attachment L of the SEIS. In summary it concluded that:

- the short term use of the marina facilities for the transportation of personnel to Curtis Island will not significantly impact the local port area and any car park impacts will be managed and mitigated through the design and construction phases
- the proposed Port Central ferry terminal to transport personnel will utilise an area where low impact port activities have historically occurred and significant development of this area will be undertaken, but the design and construction activities will be managed and mitigation is proposed to limit the potential impacts on water and air quality during the construction phase
- the proposed short term use of the existing boat ramp at Fishermans Landing and development of various facilities for the transport of materials to Curtis Island will not result in any significant impacts on the local area. Dredging for maintenance will be required and this will have some impacts on the ecological communities in the immediate area. However these impacts will be restricted, short lived and re-colonisation should occur in time.
- the Calliope River facility will require construction of twin barge ramps in the Calliope River, with the development of substantial stockpiling, truck marshalling and vehicle parking areas. These facilities will be used to hold and transport bulk and raw materials to and from Curtis Island. The construction of the barge ramps will result in the removal of an intertidal area of the river bank. However these impacts will be restricted, short lived and re-colonisation should occur in time. Dust and stormwater runoff impacts will be minimised through the adoption of both engineering and administrative controls.
- the alternative site proposed adjacent to RG Tanna coal facility will be small and will only be used in the event that the Calliope River facility is not available in time and as a result will not provide the same level of service (no raw material storage etc). A new barge ramp will be required with some associated ramp construction activities. A number of potential impacts on the environment are associated with the proposed construction and operation of the facility, but because this is an existing operating port area, they are considered to be minor.



Stakeholders Issues

GPC are concerned that they do not have enough information on product or personnel movements, transfer times, draft restrictions, dredging requirements and traffic generated to make a proper assessment on the use of these proposed marine facilities by GLNG, and to assemble a harbour traffic management assessment. For example GPC have made it clear they would impose limitations on activities that interface with the existing tourism focus at the Gladstone Marina Ferry Terminal. GPC would not allow the ferry terminal to be utilised for these commercial activities and they would not allow the use of the existing marina carparks for the GLNG project.

Coordinator-General's conclusion

I am satisfied that the LNG industry has had an impressive safety record over the last 50 years. Since international commercial LNG shipping began in 1959, for example, tankers have carried over 33,000 LNG shipments without a serious accident at sea or in port. Insurance records and industry sources show that there were approximately 30 LNG tanker safety incidents (e.g. leaks, groundings or collisions) up to the year 2002. Of these incidents, 12 involved small LNG spills, which caused some freezing damage but did not ignite. Two incidents caused small vapour vent fires, which were quickly extinguished.

I am concerned that some of the above plans to use various locations within the Port of Gladstone may not be possible as there are significant design and location issues to resolve in order to minimise impacts for other port and road users. Also not enough account has been taken of cumulative impacts of other LNG projects utilising the same or adjacent locations and roads. **I am also concerned** that the commencement of this project will result in significant additional large ferry traffic in the Port of Gladstone and heavy congestion at the ferry terminal.

Therefore in order to ensure that all potential impacts of the construction and operation of all marine loading and unloading facilities within the Port of Gladstone can be properly managed, **I impose** a series of conditions for the GLNG project which revolve around my approval of a Gladstone Logistics Plan, following the proponent's consultation with infrastructure and local authorities, as well as with other proponents, for the integrated use and of port and road facilities. These appear as Conditions 4 to 6 in Appendix 1 Part 2.

I also require the proponent to prepare and submit for the approval of Maritime Safety Queensland and the Regional Harbour Master (Gladstone), a Maritime Safety Management Plan that should ensure navigational safety is maintained at all times for the life of the project, both for harbour traffic during construction and LNG export shipping. These conditions appear in Appendix 1 Part 2 Conditions 7 and 8.

Recommendation 1

It is recommended that the proponent coordinate with other LNG proponents in regard to ferry and other related staff travel in order to stagger working shift changes and avoid high personnel shipping periods in the port environs.

6.1.3 Roads impacted by GLNG

As part of the traffic and transport study a survey was undertaken of the existing roads within Gladstone and surrounds that are expected to be primarily utilised for the construction and operations of the GLNG project. These roads are illustrated in Figure 4.4.1 and Figure 4.4.2 of the EIS and information relating to these roads detailing the general condition, speed limits and carrying capacities are described in Appendix J.

The EIS provided a determination of vehicle trips added to the road network and the traffic impacts of the following GLNG Project components:

- Construction and operation of the CSG field development
- Construction of a gas transmission pipeline
- Construction and operations of the LNG facility on Curtis Island
- Construction of a potential access road and bridge to Curtis Island for access to the LNG facility.

The assessment of these project components was considered to be a 'base case' scenario, to which alternatives were proposed based on project planning or in order to mitigate traffic impacts. Two alternative transport options were assessed, including:

- 'No Bridge' option: This assumes the potential access road and bridge to Curtis Island will not be constructed. All personnel, materials and equipment for the construction and operation of the LNG facility will be transported to Curtis Island by barge or ferry for the life of the GLNG Project; and
- 'Material by Rail' option: The 'base case' is the transport of all materials and personnel by road. The Material by Rail option assumes that pipe and other materials and personnel will be transported by rail to the fullest extent possible in order to reduce vehicle trips on the regional road network, especially within Gladstone. For this option, pipe and associated materials are assumed to be transported by rail from Gladstone Port as far as Moura. Personnel travelling to accommodation facilities will be transported by rail as far as Moura.

Attachment C of the SEIS considers the traffic impacts of additional construction and operation scenarios to those reported in the EIS. A number of mitigation measures are proposed which apply to all options assessed, including:

- intersection upgrades or contributions towards upgrades
- road construction
- payment of contributions for rehabilitation and maintenance of the state road network
- provision of workers accommodation on Curtis Island to minimise traffic movements
- provision of buses for the transport of LNG facility workers.

This report concluded that these measures are considered sufficient to mitigate the traffic and transport impacts of the proposed GLNG Project.

The SEIS has undertaken an assessment of the impact upon state controlled roads, including bring forward costs for intersection upgrades, pavement impact and increased road maintenance. No such impact assessment has been carried out on local authority roads.

Stakeholder issues

A number of regional councils expressed concern that no assessment was undertaken for local roads. Statements that "Santos proposes to enter into an agreement with council identifying the likely issues associated with road infrastructure related to the GLNG Project." and that "This agreement will identify the contribution attributable to Santos for its specific impact on road infrastructure and identify the means of mitigating this impact" without this assessment being done in the EIS or SEIS, gives regional councils no confidence that local road impacts will be fully accounted for. Some regional councils consider that any assessment should also account for bring forward costs of less than 1 year (unlike the state controlled roads assessment), not just those of more than one year, given the significant costs potentially involved.

While specific elements related to road impacts and proposed road upgrades around the LNG plant, pipeline and gas fields are discussed, there remains a need to set a number of general conditions to cover road use by the GLNG. These general conditions are especially required to cover the construction of the linear infrastructure elements of the project such as pipelines for which detailed engineering designs and detailed plant and materials transport logistics plans are not currently available.



Coordinator-General's conclusion

I consider that GLNG should consult with the DTMR Central District office, for state-controlled roads, and the relevant regional council (depending upon location of the works), for local roads, within 3 months of commencing the detailed design stage of the project to:

- provide precise details of intended usage of each road for the haulage of materials and equipment for the construction of the plant, pipeline and gas fields
- where necessary, identify any additional upgrades required to ensure that road infrastructure is of an adequate standard to support construction and operational haulage that is not identified elsewhere in this Report or provided in commitments made by GLNG
- adequately mitigate the impacts of this haulage through the implementation of agreed RMPs in accordance with DTMR and the relevant local authority standards and policies, prior to commencement of each phase of construction of each component of the GLNG
- contribute to road infrastructure improvements necessary to alleviate impacts of the project.

Therefore, in order to ensure that road and traffic impacts are properly managed, **I have included** conditions and recommendations on the above subjects for the project and **I bring** these conditions to the attention of the relevant agencies (DTMR, Gladstone Ports Corporation, DIP and all relevant regional councils) responsible for any subsequent approvals. These appear in Appendix 1 Part 2 as conditions 9, 10 and 11.

In condition 11 **I recommend** that GLNG work closely with the Officer in Charge, Gladstone District Traffic Branch, Queensland Police Service when developing the Traffic and Transport Management Plan for Gladstone. GLNG should also engage early to ensure a capability in policing response to security risks and emergencies is developed appropriately.

I also note that the proponent has made a commitment to work closely with QPS to ensure adequate planning and response measures are implemented, and **I note** that the proponent has made commitments to provide infrastructure such as marked vehicles needed to supervise the movements of over-dimensional vehicle movements.

DERM expressed concern that construction of approximately 6500 km of roads and access tracks represents a significant potential impact on land, water quality and aquatic ecosystems in the project area. The magnitude of this potential impact is not adequately described or assessed in the EIS or the SEIS, nor do the proposed mitigations reflect the extent of the potential impact. **I therefore require** that a mitigation measures associated with tracks and roads be included in the proponent's environmental management plans. This appears in Appendix 1 Part 2 Condition 12.

6.1.4 Air transport

Gas fields Roma

The EIS outlined how the construction and operation activities associated with the CSG fields are expected to take place seven days a week for 52 weeks of the year. Imported workers for CSG field construction and operations personnel are expected to work a 14-day on, 14-day off work cycle. Approximately 90 per cent of the construction workforce is expected to reside outside of the area, and attend site on a fly-in/fly-out basis. In order to model the most conservative scenario, all workers were assumed to leave from Roma, travel to the worker accommodations by bus (assumed 20 passengers per bus) and work in the CSG fields for 14 days, before returning to Roma for 14 days off. This assessment estimates that rolling shift changes will occur once every two weeks, with half occurring during the combined peak hours (morning and afternoon) of project traffic generation.

Primary access to the CSG fields will be from the state-controlled road network and flights from Brisbane to Roma.

Stakeholder issues

Maranoa Regional Council made a submission to the EIS raising concerns over the impacts of substantially increased passenger numbers at the Roma Airport. The increase in passenger numbers could be as much as 35,000 and this level of increase is beyond the capacity of Roma Airport and could not be accommodated through Injune Airport. Cumulative effects associated with other projects will only serve to amplify the lack of capacity to cater for project associated demand.

Proponent's response

In the SEIS GLNG state that they are working with appropriate stakeholders to understand and ensure that suitable mitigation measures are implemented to offset the potential impacts on the Roma Airport from the project.

Coordinator-General's conclusion

I consider that GLNG should make a financial contribution to any airport upgrades that may be required at Roma. In order to ensure impacts of the project on Roma Airport are adequately managed, GLNG would need to consult and agree with Maranoa Regional Council about the design and timing of any upgrades required and allow enough time to obtain appropriate approvals for the works. **The condition I recommend** is in Appendix 1 Part 2 Condition 13.

LNG plant Gladstone

LNG plant construction personnel are anticipated to work a 10 days on and 4 days off roster in a fortnightly work cycle. Most construction personnel are expected to be housed in workers accommodation on Curtis Island during their shifts. Each worker will travel to/from Curtis Island once per fortnight as they rotate onto or off their shift.

During the construction of Trains 1 and 2 of the LNG facility, workers are expected to be local workers or distant workers that fly into Gladstone or drive from surrounding regional centres such as Rockhampton and will then be transported by bus to the ferry terminal in Gladstone, where they will be transported by ferry to Curtis Island.

Stakeholders issues

In its submission on the SEIS Gladstone Regional Council stated that it had already committed \$65m to upgrade the Gladstone airport, both the runway and the terminal. This project will be completed in mid 2010 in time for both the GLNG and other LNG projects and the fly in/fly out proportion of their workforce.

In its submission to the EIS, Gladstone Regional Council expressed concerns about the limitations being placed on Gladstone Airport by the heat plume from the LNG site. Any limitations would be put in place by CASA and not the airport operator. The plume risk assessment prepared in the EIS indicates that significant impacts are likely and these are a concern to Council in terms of the consequential impacts on accessibility to Gladstone Airport. This in turn impacts on the long term economic value of the asset.

GLNG plan to construct a helicopter pad near the LNG plant to assist emergency extraction of workers should the situation warrant. Gladstone Regional Council commented that in the EIS the location and accessibility of the emergency helipad is unclear



Proponent's response

In the SEIS GLNG advised that the LNG facility design is still being finalised as part of the project's front end engineering design process. Once the facility design is finalised GLNG will discuss (if required) the location of any emergency helicopter landing area with Gladstone Regional Council and the Department of Infrastructure and Planning for approval. The site will have to avoid the areas of the site subject to plume rise impacts that are yet to be properly assessed.

Coordinator-General's conclusion

As other LNG facilities are planned for Curtis Island **I require** a cumulative assessment of aviation airspace. The SEIS did not satisfactorily address this, therefore **I nominate** a condition in Appendix 1 Part 2 Condition 15. **I also nominate** a condition on the location of a helipad - Appendix 1 Part 2 Condition 17.

6.1.5 Cumulative transport impacts

The EIS briefly alluded to other major developments that are proposed in relation to areas in which the GLNG Project will be constructed and operated. These were described in section 1.7 of the EIS. The EIS stated that there is limited information available as to the planned development of those projects or the scale and timing of their construction which affects the ability to undertake an assessment of the possible cumulative transport impacts.

A review of the available information and planning stage for each project as well as the useability of the information for this study was undertaken in the EIS. Only the following projects had information publicly available that was in a form to be readily included in the assessment of the cumulative traffic impacts:

- Gladstone Pacific Nickel Refinery Project
- Moura Link – Aldoga Rail Project
- Wiggins Island Coal Terminal Project.

The EIS presented a qualitative review of the recommendations for each project to provide context and maintain consistency with the recommendations of this assessment. It was found that both the Gladstone Pacific Nickel Refinery Project and the Wiggins Island Coal Terminal Project have identified impacts at the Hanson Road/Blain Drive/Alf O'Rourke and Hanson Road/Red Rover Road intersections and recommend mitigation measures to provide two-lane roundabouts at these locations.

Coordinator-General's conclusion

The emergence of multiple and overlapping proposals for LNG and other significant resource sector developments will more than likely result in significant cumulative impacts for communities and regions, including state and local road networks. The Terms of Reference for the EIS for this project require the proponent to identify cumulative impacts of projects where possible. As discussed above, information provided to date does not provide a clear assessment of the impacts of multiple projects especially other LNG projects on road networks.

Transport cumulative impacts need to be investigated because, although one project may not trigger road upgrades, or a drop-off in service standards, the cumulative effects of three or four significant projects utilising road infrastructure concurrently, or even consecutively, may cause overloading of capacity. This could potentially result in congestion or pavement impacts, negatively impacting on road safety and trigger the need for mitigation and road upgrade works.

To ensure present proposals include appropriate impact mitigation, road contribution strategies for a number of scenarios which take account of the number of proposed projects, construction schedules, timing and transport tasks, **I have initiated** a proposal that DIP, in conjunction with DTMR, conduct a Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts. As a consequence **I therefore nominate** such a condition in Appendix 1 Part 2 Condition 9.

6.2 Social and economic

Potential social and economic impacts of the GLNG project have been identified during the EIS process for both its construction and operational phases for each of the three major project components of the project.

A social impact assessment (SIA) for the Gladstone Liquefied Natural Gas (GLNG) project was conducted by GLNG over three distinct study areas in relation to the following project components:

- Coal seam gas (CSG)
- Gas transmission pipeline route
- Liquefied natural gas (LNG) facility

6.2.1 Social impact

6.2.1.1 CSG field

The CSG field workforce and accommodation requirements in the coal seam gas fields will be substantial. The project involves the development of approximately 2 650 exploration and production wells. It is anticipated that about 1200 wells will be established prior to 2015, with potential for 1 450 or more additional wells after 2015.

Santos intends to house its construction and most of its operations workforce in Temporary Workers' Accommodation Facilities (TWAFs) throughout the CSG field. These TWAFs will be established within reasonable driving distances of active areas in order to situate workers as close to work areas as possible. All CSG field workers will be housed in their TWAFs for work rotations but return to their homes after rotation.

Employment in the CSG fields around the Maranoa region will include a peak workforce of 1 500 workers in 2013 and 925 workers for the remainder of the GLNG project.

The roster for construction workers will be 3 weeks on and 1 week off. Operational workers will work on a 2 weeks on and 2 weeks off roster.

The CSG fields workforce will be housed in temporary and permanent accommodation facilities close to the work front. These facilities will be similar to the existing accommodation camps at Santos' Fairview operations, and located well away from local communities.

The TWAFs facilities will typically contain, air conditioned demountable style accommodation units; dining and kitchen facilities; offices; recreational facilities; laundry; onsite medical facilities and services; cold room; waste collection facility; car park; and fencing and access roads.

Santos had indicated that regardless of the primary place of residence, all workers will be required to remain in the camp for the duration of their roster.

Santos expects a larger percentage of local workers for ongoing operational employment than it does for construction given the very low unemployment rate within the Maranoa region and the lack of available skilled labour. However since there is a substantial permanent workforce at the Roma Centre and Roma Gasfield it is proposed that many of these will settle in Roma.



Potential social impacts for the CSG field

The EIS, Appendix Z Santos GLNG Social Impact, section 9, (Table 9-2) provides information on proposed impacts on the CSG Field. The proponent identified a range of social components which were rated as having potential impacts. A summary of the identified social impacts follow:

CSG field well and infrastructure location uncertainty

The lack of information regarding the precise location of wells and other infrastructure in the CSG field has resulted in induced uncertainty in landholders within the tenement areas who do not know whether they will be directly or indirectly impacted as a result of the project, making it difficult for effective property management.

The proponent has identified that a number of landholders are likely to be affected by the CSG field. However, the proponent has indicated it will implement a leading practice landholder consultation and engagement program to address landholder concerns in relation to ongoing CSG field development planning. Santos propose an engagement program to address issues relating to the explanation of the CSG extraction process; plain English interpretation of land access legislation and guidelines; land access protocols acceptable to the landholder; information on the location of infrastructure; and a commitment to land diminution and compensation negotiations with landholders.

Roma airport

The EIS-Social Impact Assessment (SIA) identified the large number of Fly-in/Fly-out (FIFO) workers as likely to place extra demands on the Roma airport.

The proponent has evaluated this potential negative impact as minor to moderate. In response, this will be mitigated through ongoing consultation with the Maranoa Regional Council to monitor the passenger movement in and out of the Roma airport. The proponent proposes to develop strategies with local government and private airlines to address impacts that arise from increased flow of workers in and out of the area.

Roma town water supply

There may be increased demands on the Roma town water supply, depending on the location of gas wells, where dewatering activity has the potential to impact negatively on existing bores supplying water to the Roma township area and Roma town water supply.

The proponent has evaluated this negative impact as moderate to high. It acknowledges that any reduction in subsurface water sources may negatively impact the long term sustainability of the town's water supply. To mitigate this negative impact the proponent proposes to undertake technical analysis of any potential interface with the town borefield as part of gas well location investigations, and to monitor groundwater usage and levels in the vicinity of town water supply bores.

Movement of local workers to project

Increased local employment opportunities from the project may encourage the movement of local workers from existing businesses to the project, resulting in negative impacts on local businesses.

The proponent has evaluated this negative impact as moderate to high. Santos acknowledges that the ability of large resource companies to pay higher wages and provide better working conditions, provide a source of grievance to the local community which has to pay more for services as a consequence. To respond to the potential negative impacts on local businesses, the proponent has indicated it will monitor recruitment from the local community, including information on previous place of employment. Should evidence emerge of negative impacts on local businesses, Santos has indicated it intends working with

Maranoa Regional Council and the identified businesses to develop measures to address worker transition impacts.

Increased demand on accommodation

Increased demand for housing for the workforce may raise the levels of rents and price of housing, making it less affordable to locals with low income households; and placing increased demands on housing availability in the area.

The proponent has evaluated this negative impact as low to moderate impact. Santos has indicated that the build-up of the workforce at Roma will not be rapid and there is a large amount of land surrounding the town available for domestic and commercial purposes. Santos proposes the majority of the construction and operations workforce will reside in the Temporary Accommodation Facility (TWAF) and so will not impose significant demands on Roma accommodation. The proponent proposes to maintain regular liaison with the Regional Council and local accommodation providers to remain informed of any emerging issues.

Increased population and access to community health services

The increased population will mean increased demand and less access to quality health services in Roma for the existing workforce and residents. The proponent has evaluated this negative impact as low. Santos has stated that the majority of the workforce will reside in TWAF's away from Roma where they will have access to basic health care while on site. Requirement for the workforce to visit local health care providers will be limited, and will be able to be tracked by local service providers and Santos. The proponent proposes a mitigation strategy which is to use community relations staff, to monitor the satisfaction of the community in regard to the provision of health services.

6.2.1.2 Gas transmission pipeline

The gas transmission pipeline will involve a 435 kilometre underground pipeline which will run from the CSG fields to the gas liquefaction and export facility on Curtis Island. The pipeline, where practicable, will parallel the existing Roma to Gladstone pipeline.

It is anticipated that up to 1 000 construction workers will be required during the construction of the gas transmission pipeline. They are expected to work 10 hours per day, 7 days per week with no night-time construction activity planned. Crews will typically work for 4 weeks followed by 1 week off on a rostered system.

The workers will be housed in Temporary Workers' Accommodation Facilities (TWAF's). There will be 2-3 main TWAF's and 1-2 satellite TWAF's which will move along the route as the pipeline is constructed. Construction of the pipeline will begin in Gladstone and finish in Fairview. Workers will fly into Gladstone or Roma and be transported via bus to the TWAF's. Pipeline materials will be imported via ship and transported via road [or rail] and stored in temporary locations along the pipeline route.

The proponent has identified 110 private landholders directly affected by the gas transmission pipeline with an additional 20 (approximately) that may be affected as a result of site alignment adjustments.

Potential social impacts for the gas transmission pipeline

The EIS, Appendix Z Santos GLNG Social Impact, Section 9, (Table 9-5) provides information on proposed impacts of the gas transmission pipeline. The proponent identified several social components which were rated as having potential low impacts. The exception was the social component of employment which the proponent rated as having a potential medium impact during construction. A summary of the identified social impacts follows:



For the gas pipeline component of the project the social components which the EIS rated as having a low impact were:

Demographic profile

The potential impact of changes to the demographic profile of the region was rated by the proponent as low and as having no anticipated impact, since the workforce will be housed in the Temporary Accommodation Facility (TAAF).

Employment

The potential positive impact for the project was identified as providing opportunities to reduce the unemployment rate. The proponent has indicated the project will provide the opportunity to reduce unemployment, particularly around the Gladstone Region and provide opportunities for local employment.

Income and affordability

The potential impact on income and affordability is rated as low. Potential for increases in weekly incomes and increased cost of living have been identified.

Housing and accommodation

The potential impacts in relation to some management and contractors who may seek temporary housing in local hotels and motels were rated as low impact. The mitigation is the coordinated use of tourism accommodation with accommodation owners where possible.

Health services

The potential negative impact relating to health services being unable to cope with additional demand was rated as having a low impact. The proponent proposes a mitigation strategy which informs local health services prior to commencing activities in the area.

Education and training

The potential impact of there being limited availability/insufficient education and training facilities/vacancies was rated as low impact. The proponent proposes a mitigation strategy to liaise with Education Queensland to develop a skills training program to maximise education opportunities.

Emergency services

The potential impact that emergency services are unable to cope with additional demand is rated as low. The proponent identifies a mitigation strategy to inform local emergency services prior to commencing activity in the area.

Strain on local facilities and services

The potential impact of increased pressure on local facilities and services is rated as low. No anticipated impact since the workforce will be housed in the TAAF. The impact describes minimal use of local services; and a likely economic benefit to business owners. The proponent proposes to explore the potential to procure some supplies locally if possible.

Community values, lifestyle

The potential impact indicates a reduction /loss of community values and lifestyle. The SIA evaluation that the project does not meet community expectations was rated as having a low impact. The proponent will become an active member of the community, supporting events and promoting community values during the construction phase.

6.2.1.3 LNG facility

The proponent proposes that the LNG facility will comprise the following elements:

- a liquefaction facility that includes the on-shore gas liquefaction and storage facilities
- marine facilities which will include a product loading facility (PLF) for loading LNG into ships for export, and a materials offloading facility (MOF) and haul road for the delivery of equipment, plant and materials to the LNG facility site

- a swing basin and an access channel from the existing Targinie Channel in Port Curtis (Gladstone Harbour) and a dredged material placement facility at Laird Point (required only if other, preferred alternatives are not available).

The proponent has indicated that up to 2 800 construction workers will be employed at peak of the combined construction of Trains 1 and 2 in 2013⁴. Santos expects a larger percentage of local workers for operation of the LNG facility due to the availability of skilled labour than it does for construction. Given low unemployment rates, Santos expects a mixture of local and FIFO employees

The construction workers will be housed in Temporary Workers' Accommodation Facilities (TWAFs) on Curtis Island. Access to the LNG facility from the mainland will occur by barge and ferry. The TWAFs will be located adjacent to the LNG facility which will enable convenient and safe transit of workers. The roster for construction workers will be 10 days on and 4 days off.

The coal seam gas will be converted to liquid form (LNG) at a facility to be built on Curtis Island, Gladstone. The LNG facility will operate 24 hours a day, 7 days a week.

The operational workforce for the three train LNG facility will be approximately 250 people. A split of 60 per cent local and 40 per cent imported labour is anticipated for the operational workforce.

Santos has outlined the proposed workforce accommodation strategy to take account of 28 per cent of its construction workforce from local sources and also place 10 per cent of its workforce in mainland accommodation to cater for those who wish to relocate, some with families. Hence, the TWAF on Curtis Island may house 62 per cent of the LNG Facility workforce.

Potential social impacts of the LNG facility

The EIS, Appendix Z Santos GLNG Social Impact, section 9 (Table 9-8) provides information on proposed impacts of the LNG Facility. The proponent identified a range of social components which were rated as having potential impacts. Identified concerns are:

Demographic profile

The potential impacts relating to significant increase in population, change in male-female ratio, age family structure and other factors affecting existing community characteristics is rated as high during construction. The proponent proposes a mitigation strategy to prioritise local employment over non-local employment where possible and practical.

Employment

The potential impact relating to opportunities to reduce unemployment rates and the potential to increase the local skills capacity, by providing local based employment for residents who previously travelled outside of the area for work is rated as low for all project phases. The proponent's proposed mitigation strategy is to assist in improving the local and regional employment opportunities and develop the skill levels of the local community.

Income and affordability

The potential impact relates to increases in weekly income; increase in cost of living. The impact is rated as low during all project phases. The proponent's mitigation strategy is to provide local employment as a priority.

Housing and accommodation

The potential impact of increased cost of housing and limited housing availability is rated as high during construction. The impact is considered acute for low income and disadvantaged groups in the community. The proponent proposes the issue will be mitigated through housing the large proportion of construction workers in the TWAF, the use of non-local workers predominately FIFO/DIDO, liaison with relevant

⁴ Train 2 is expected to commence between 12 to 16 months after Train 1 commences and run simultaneously with Train 1.



stakeholders to stimulate construction of housing and accommodation; acquisition/leasing of some properties for workers and families; and providing housing accommodation for families outside Gladstone.

Health

The potential impacts relate to the perception that the air quality is causing health issues and that health services are unable to cope with additional demand. The impact is rated as high during construction and low during operation and decommissioning. The proponent proposes a community consultation and stakeholder engagement program to focus on project issues related to air quality and green house gas (GHG) emissions; liaison with Gladstone Regional Council to identify perceived and actual risk and a community awareness program on air quality and the project. The proponent also proposes to communicate the NPI website to community stakeholders to increase awareness and integrate the Gladstone air quality assessment with the GLNG project.

Education and training

The potential impact relates to limited availability/insufficient education and training facilities/vacancies. The impact is rated as low during all phases of the project. The proponents mitigation strategy is to liaise with Education Queensland .and develop skills training programs to maximise education opportunities.

Strain on local facilities and services

The potential impact is based on the number of construction workers required to build the LNG facility, the requirement to house and feed them, and the materials required for construction. It is anticipated that the project may put a strain on local facilities and services. Impacts are rated as extreme during construction, low at operation and medium during decommissioning.

The proponent proposes a mitigation strategy which is to consult with Gladstone Regional Council and the Interagency group in regards to local service requirements and to provide an opportunity for local services to expand their services in order to benefit from the project and to assist with local service delivery for the project.

Programs and agreements may be required to reduce the potential for lost or strained local services in order to accommodate the project. Develop and implement a consultation and engagement strategy relating to local facilities and services usage by the project. Consult with Gladstone Regional Council and key stakeholders to identify perceived and actual risks and realistic mitigation or enhancement opportunities. Develop procurement policies and communicate these to community and services providers to increase knowledge of the project demands and requirements.

Community values—lifestyle

The potential impact is the reduction/loss of community values and lifestyle; and that the project does not meet community expectations. Impacts are rated as medium during construction and operations and low during decommissioning. The proponent proposes a mitigation strategy which is to continue to consult to identify community values and issues; and to become an active member of the community, supporting community events promoting community values.

Movement of local workers to project

Transition of workforce over to industry (LNG facility). The potential impact is some of the local workforce will transition over the project, however the vast majority are anticipated to already be based in other similar industries in Gladstone including construction. The impact is rated as medium during construction and low during operation and decommissioning. The proponent's mitigation strategies are to contribute to local well-being programs in order to enhance programs for those who may directly or indirectly impacted by the transition local workforce. Develop local training provision, which may consider the evaluation of subsidies for potential serious impacted businesses. Develop policies for aiding the transition for prospective employees and reducing the impact on local businesses. Consult with Gladstone Regional Council to identify specific and actual risks and better assess the project effects on employment rates and other projects in the area. Develop and implement a targeted project sponsorship/community support program for services in Gladstone.

Coordinator-General's conclusion

I **note** that the social impact assessments for each of the GLNG project components have highlighted several common social impacts, while specific issues have been also been identified.

6.2.2 Agency issues

The key issues raised by advisory agencies, in response to the social Impact assessment section of the EIS relate to:

Workforce accommodation

- uncertainty in relation to the size and location of Temporary Accommodation Facility (TWAF) to be located within the CSG field and throughout the Gas Transmission Pipeline route
- changing demographic profile of the population, with the continued and expanded use of contract employees for fly-in/fly-out or drive-in/drive-out employment
- cumulative impacts associated with workforce accommodation from other significant developments in terms of accommodating construction workers
- lack of clarity in the proposed size and location for the construction worker's camps for the CSG field.

Housing impacts

- impacts on supply of affordable housing and need to monitor impacts for the project areas
- impacts on the local accommodation market.

Social infrastructure and community services

- mitigation of social impacts and requirement for the completed social management plan.
- workforce access to services on the mainland for recreational, health or social service purposes.
- perception there is a significant under estimation of impacts on services such as health; community services; housing; recreational facilities; education; transport; social infrastructure and service delivery; and emergency services.
- pressure upon local services due to increasing populations, with particular reference to the capacity of police and emergency services to respond to service standards and responding to emergencies;
- requirement for additional police resources, including staffing increases to the Central Police Region, new police stations, specialist resources and other equipment needs.
- ongoing impacts on social services in the Gladstone, Roma and Central Highland Regional Council and the Banana Shire arising from the population increase associated with the direct and indirect construction workforce.

Employment and economics

- need for employment strategies and support programs that maximise employment opportunities for local disadvantaged job-seekers, under-employed people and indigenous people including support for job preparation and training
- Impacts on local business and potential for upward pressures on local wages which may result in local employers not being able to retain employees
- concerns that the accommodating of the LNG construction workers on Curtis Island will minimise the financial benefits to Gladstone, and reduce house purchases, increase living cost such as property rentals, and limit the opportunity for the purchasing of local goods and services.

Traffic, safety and health

- negative health impacts due to dust emissions pose a potential health risk to workers and sensitive receptors in the vicinity of the construction site
- increased transport infrastructure demands for infrastructure and services
- management of incidents and complaints regarding traffic and transport movements



Overall EIS and SEIS agency submissions expressed a consistent need to maintain community consultation in a manner which promotes open dialogue with the residents and businesses; and keeps state and local government, key stakeholders and the community informed and consulted throughout the life of the project.

Coordinator-General's conclusion

I **note** the concerns raised in the agency submissions in relation to potential social impacts and will consider them further as I deal with other issues in this report.

6.2.3 Cumulative impacts of the project

In both the EIS and SEIS, submissions raised concerns in relation to the potential cumulative impacts of multiple LNG projects being developed simultaneously in the region.

The advisory agency comments identified there are a number of potentially positive and negative flow-on effects from cumulative impacts of the potential CSG industry beyond the GLNG Project on rural and regional communities, but of most relevance to primary industries is the:

- Increased strain on services available to primary producers (particularly freight)
Reductions in labour availability to primary industries as the CSG industry partially absorbs the local workforce if labour is sourced locally. Importantly this can be a positive impact on the community by offsetting losses in agricultural enterprises in challenging economic or climatic conditions.
- The higher salaries paid by CSG companies will place pressure on producers to match those salaries to retain or attract skilled workers, further impinging on the economic viability of agricultural enterprises.

Mechanisms to address these issues should be included in the proposed Social Management Plan as per section 11.16.25 of the EIS.

The cumulative population growth from the multiple projects could result in unsustainable increase in demand on the existing social infrastructure in the area. The Gladstone Regional Council considered that Santos must take ownership of these demands on infrastructure and act now rather than after the community is in crisis.

The Gladstone Regional Council also expressed concerns about the cumulative demand of proposed major projects on housing availability in the region; and the cumulative effects of the project on recreation and recreational facilities.

The Department of Communities noted and acknowledged the proponent's response to concerns by Maranoa Regional Council in relation to the issue of affordable housing and the commitment by the proponent for ongoing monitoring in consultation with Council. However, the social and community cumulative effects of multiple LNG projects being developed simultaneously was of interest to the agency. In this regard, the additional studies and assessment as detailed in Attachment J of the SEIS were noted.

The main cumulative social impact issues raised by submitters included:

- changing demographic profile of the region
- workforce accommodation (on Curtis Island and on the mainland in Gladstone)
- increased traffic (including marine) – disruption of social movement and visual impact
- housing availability and housing affordability in the region
- increased living costs, and demands on low income households
- increased demands on community facilities and services
- increased use of recreational facilities
- social and community cumulative effects of multiple LNG projects being developed simultaneously

- impacts on community values and lifestyle due to potential negative social impacts including quality of life - health impacts on the existing communities affected by the project.

Coordinator-General's conclusion

I **agree** that multiple projects could if concurrent add more pressure than a single project to housing and housing affordability, to demands on community facilities and services and have potential to change community values as the workforce grows and economic activity increases.

6.2.4 Managing social impact in resource communities

6.2.4.1 Government policy

The Queensland Government's Sustainable Resource Communities Policy was released in September 2008. It builds on the Sustainable Futures Framework for Queensland Mining Towns released by the Government in June 2007. The Policy outlines the Government's commitment in partnership with industry and local government to strengthening social impact assessment within existing Environmental Impact Statement processes. The initiatives contained in the Policy reinforce the principles of leadership, collaboration, corporate responsibility, sustainability, communication and community engagement.

Improved social impact assessments have been identified as a core strategy to deliver better community outcomes as they provide:

- an existing mechanism for identifying and appraising the social impacts and mitigating the adverse impacts on communities of proposed major new and expanded mining and petroleum developments
- an existing framework within which all stakeholders, including state and local government, the mining industry and the community, can have input into the decision making process in relation to those major mining and petroleum developments that will affect them.

As part of the Policy, the Government has established a Sustainable Resource Communities Fund to improve social infrastructure in communities affected by mining industry growth.

In March 2010, the Government announced provision of \$23.6M in funding for the Surat Basin to manage the rapid growth associated with the expected boom from the Liquefied Natural Gas Industry.

The \$23.6M funding package includes:

- a \$4.7M contribution towards an upgrade of Roma airport which will include the runway, terminal, car park, security fencing, access road and work to enable access by larger aircraft with further contributions to come from Council and Industry
- \$4.6M to refurbish the Dalby Aquatic Centre and replace its existing pool with 25m [eight lane] and 16m [6 lane] pools
- \$4.5M to establish a Trade Training Hub in the Surat Basin with the construction of a training centre at Miles State High School and the refurbishment of existing school-based industrial workshops at Wandoan and Taroom schools. The participating schools will be working closely with the Coal Seam Gas industry to ensure that students are equipped with high quality training specialising in Coal Seam Gas production skills
- \$2.9M to purchase or build staff housing for the Queensland Ambulance Service at Taroom, Meandarra and Surat
- \$2.7M to build affordable housing for lower wage workers in key service roles ranging from hospitality to food service and childcare



- \$2.6M to replace the Chinchilla Community Centre with new facilities
- \$1.5M [on top of \$4.3M previously announced by the Queensland Government] to upgrade intersections and widen and seal roads to make them safer
- \$120,000 to construct a new SES building in Mitchell
- \$30,000 to provide a new fit-out for the SES Building in Surat.

6.2.4.2 Social Impact Management Plan (SIMP)

The Queensland Government's *Sustainable Resource Communities Policy* 2008 states that proponents of new/expanding major resource development projects will be required to develop a Social Impact Management Plan (SIMP).

A SIMP will be required for new/expanded major resource development projects which require an environmental impact statement (EIS) to be prepared under either the *Environmental Protection Act* 1994 (EP Act) or the *State Development and Public Works Organisation Act* 1971 (SDPWO Act) or projects which DERM has given approval to a proponent to voluntarily prepare an EIS.

The purpose of a SIMP is to establish the roles and responsibilities of proponents, government, stakeholders, and communities throughout the life of a project in the mitigation and management of social impacts and opportunities associated with the construction, operation and decommissioning of major resource development projects

I note that the Department of Infrastructure and Planning (DIP) Social Impact Assessment Unit (SIAU) has prepared draft SIMP guidelines and template to assist proponents with the development of each proponent's SIMPs.

I note that a consultation program arranged by DIP to seek input into the draft guideline and template is underway to finalise the SIMP guideline and template by July 2010, and the proposed legislative amendments program is planned for introduction by end of 2010.

Although the preparation of the SIMP is not a requirement of the GLNG project's Terms of Reference (TOR). I **note** the proponent is preparing a draft SIMP for consultation with the community.

GLNG draft SIMP

The proponent has indicated that its SIMP will monitor social impacts associated with the project and work with local service providers and stakeholders to develop practical solutions. The proponent has indicated that unforeseen impacts will be identified through established consultation networks and that the plan will allow the proponent to mitigate negative social impacts, enhance positive impacts and update the management strategy as the project evolves.

The proponent's draft SIMP consists of Part A and Part B as follows:

Part A—Project context

Part A provides an overview and summary of information from the EIS and the supplementary EIS, in particular Attachment D1 to the Supplementary report. This section includes:

- Santos' commitment to sustainability
- project summary—GLNG Project
- social and cultural areas of influence
- key social baseline study issues
- potential contributions to regional development
- community engagement summary.

Part B—Social Impact Management Plan

Part B provides tables which link the identified social impact issues to the mitigation strategies to be undertaken by the proponent. It relates to:

- impacts, assessment and mitigation management tables
 - land impact
 - health and safety
 - social infrastructure
 - housing and accommodation
 - employment and procurement
 - amenity
- monitoring plan
- community engagement strategy.

The proponent contends that the draft SIMP provides the opportunity to enhance the positive benefits of the project, whilst managing and mitigating potential adverse impacts. Specifically, that the draft SIMP will link the impacts articulated through the SIA into programs and projects that allow for this enhancement and mitigation, as well as providing a way to effectively measure these initiatives over time.

Coordinator-General's conclusion

I commend GLNG for identifying the need for a social impact management plan referred to as a 'social management plan' in the EIS SIA and associated documents.

I note that the proponent has indicated a commitment to develop and implement a social management plan to monitor social impacts associated with the project and work with local services and stakeholders to develop practical solutions

DIP, however, has advised that the proponent's preliminary draft SIMP requires further work to achieve the high standard **I will require** for the project to demonstrate it has effectively dealt with the proposed social impacts and cumulative impacts identified during the EIS process.

I require that the proponent develop the SIMP in collaboration with stakeholders in accordance with the *Sustainable Resource Communities Policy* 2008 and the Department of Infrastructure (DIP) draft SIMP guidelines

I also require further development of the SIMP in regard to the mitigation strategies and development of key performance measures for the plan, so that the SIMP can annually and periodically report progress. This is a necessary compliance requirement to satisfy the ongoing reporting, review and auditing arrangements **I will require** for all SIMPs in relation to major resource development projects.

Although the SIMP will be completed after the EIS process, **I will be requiring** the proponent complete the draft SIMP and that it be released for consultation with stakeholders and then submitted to me for approval prior to implementation and commencement of construction.

I require all the social impacts and associated conditions contained in this report must be considered in the final SIMP.

Therefore in order to ensure that the proponent adequately mitigates and manages the potential social impacts identified in the SIA; and importantly demonstrates that consideration has been given to the concerns raised in the EIS and SEIS submissions and by DIP, Social Impact Assessment Unit (SIAU), **I set** these conditions in Appendix 1 Part 3.



6.2.4.3 Community engagement and dispute resolution

Community engagement is a key issue raised in the EIS and Supplementary EIS submissions. For example, the Central Highlands Regional Council's recommends the employment of full time liaison officers who are permanently residents in the communities along the pipeline and near major project facilities to liaise directly with land owners, the community, emergency services and Council.

In the EIS submissions, the Queensland Police Service's (QPS) stated that the proponent should engage in consultation with QPS regarding a range of issues for both planning and responses associated with impacts of the project which will assist QPS in determining policing impacts, strategic planning, resourcing and how the QPS can best support the development of projects and service delivery to affected areas. The Department of Communities (DOC) requested that the proponent maintain an open dialogue with the residents and businesses in the various areas to keep them informed and consulted where appropriate.

In the SEIS submissions, the Maranoa Regional Council (MRC) notes the proponent's series of commitments including the establishment of the Maranoa Regional Council Community Consultative Committee. The Banana Shire Council would like to see Santos engage formally with Council. The Department of Communities states the agency has reviewed the SEIS and notes an ongoing commitment for a community consultation and engagement program.

GLNG's proposed community engagement strategy

The proponent has expressed the recognition of the importance of well planned community engagement, incorporating the following approach:

- Recently, established community shopfronts in Roma and Gladstone as a further demonstration of commitment to community access.
- Production of an annual Community Engagement Business Plan that specifies a range of actions to drive community engagement.
- Development of a Stakeholder Management Plan for the purposes of analysing stakeholder needs and tailoring engagement strategies to suit the level of interest and impact relative to each stakeholder.
- Providing a range of opportunities for community members to provide feedback on the quality and appropriateness of its community engagement strategies including- 1800 free-call service; website; freepost service; survey instruments; market research; community workshops and public information sessions.
- Periodic community information sessions where landholders and community members are invited to a public forum to talk about the project and any concerns that might be held.
- Conducting issue specific workshops inviting a cross section of the community to discuss potential solutions to key issues (e.g. associated water management has been workshopped with local communities in Roma, Wallumbilla and Arcadia Valley).

GLNG's Indigenous engagement

Throughout the EIS SIA the proponent has indicated that introduction of the Santos Aboriginal Engagement policy and initiatives are underway.

In the EIS submission received from the Port Curtis Coral Coast Aboriginal Corporation, opportunities to bring much needed employment opportunities and provide an economic stimulus for the general Gladstone community, including PCCC claim group members was supported. The submission was seeking to ensure that the Project impacts are appropriately managed, and that the PCCC people be able to, in partnership with the project proponent, seek to ameliorate the potential impacts, if possible, on PCCC Culture, and Cultural Values and the environment.

The proponent's draft SIMP refers to a Santos Aboriginal Engagement policy and an Indigenous Affairs Program (2008 – ongoing). The draft SIMP indicates that Santos will continue implementation of its Indigenous Affairs program which includes:

- A consultative approach to Indigenous Land Use Agreements and Cultural Heritage Management Plans
- GLNG Aboriginal Development Plan
- Aboriginal Training and Employment Strategy
- Implementation of its Aboriginal Engagement policy
- School based indigenous program.

I support this direction of the project in relation to the Indigenous Engagement Program and Indigenous Engagement Policy and Indigenous Affairs Program

GLNG proposed dispute resolution mechanisms

The proponent has advised DIP that its approach to dispute resolution is one that is focussed on prevention rather than reaction, incorporating:

- Information systems and processes in place for recording complaints, grievances, issues or disputes.
- A dedicated community information line (1800 freecall service) where community feedback is captured and recorded in the stakeholder management database; and actions are recorded and forwarded on to the relevant subject matter experts within Santos for prompt resolution;
- An Incident Management System; and
- A Complaints Management System and a process for resolving disputes with landholders over land access matters.
- Established a new Area Manager position in Santos' Queensland CSG fields. This officer is held in high regard by the local community and local government. This role will provide a local authority to deal with community complaints promptly and effectively. The position also reports into the Community and Environment team within Santos.

The proponent has indicated that a proactive approach to dispute resolution includes:

- Employment of dedicated landholder advisors to ensure landholders have someone they can contact at any time of the day or night when an issue arises.
- Maintaining high standards of conduct by personnel operating in the field (Code of Conduct).
- Providing training and induction of the workforce in relation to the safety and welfare of themselves and the local community.
- Establishing clear accountabilities for EPC contractors yet to be engaged by the project in regard to dispute resolution and issue management.

I note the proponent has prepared a preliminary Social Impact Management Plan (SIMP) as discussed in section 6.2.4.2 of this report and this section which provides some information on the GLNG Community Engagement Strategy.

I note the proponent's commitment to continue with community engagement activities to support local and regional programs and initiatives, some of which require "in kind" support or financial contributions to Community Development and Community Awareness Programs relevant to the project, and/or are part of the Stakeholder Engagement Program; GLNG Commitments Register; Community Investment Fund; or in the implementation of the SIMP.

Coordinator-General's conclusion

I support a strong approach to community engagement and **I believe** that a clear commitment and process for dispute resolution should also be a priority and therefore **I impose** Conditions 2 and 3 in Appendix 1 Part 3.



6.2.4.4 Governance arrangements

Industry Leadership Group for CSG resource projects

I have been advised that the concept of establishing an overarching Industry Leadership Group for CSG resource project proponents/companies has been discussed with the proponent. The proponent has advised that there is strong merit in developing an Industry Leadership Group and would participate in such a committee. The proponent feels the group would receive more traction if convened and chaired by an independent party such as DIP for example or Queensland Resources Council, APPEA or perhaps an existing leadership group already in existence such as the Surat Basin Corporation or the Gladstone Industry Leadership Group.

Coordinator-General's conclusion

I feel there is merit in the Industry Leadership Group being chaired by an independent chair, however **I recommend** that the proponent take a leadership role in the establishment of the group, if its project is the first to reach financial close and announce commencement of construction. This arrangement must be discussed and negotiated with other LNG projects proponents, and discussed with the DIP.

I note concerns raised in the EIS and Supplementary EIS submissions in relation to the potential for cumulative impact which will require planning mitigation and management, including social and community cumulative effects due to multiple LNG projects being developed simultaneously in the region.

I consider that identifying cumulative impacts and developing mitigation measures for new projects is the responsibility of industry in partnership with local and state governments and community sector stakeholders.

I propose the establishment of an overarching Industry Leadership Group for CSG Resource Projects which would provide cross-project coordination in relation to the social and community cumulative effects of multiple LNG projects being developed simultaneously across the regions (Gas Fields, Pipeline and LNG plant).

In order to ensure that the cumulative impacts associated with this new emerging industry are adequately addressed and minimised, all new CSG resource projects will be required to establish, or participate in the new Industry Leadership Group for CSG Resource Projects, as set out in Condition 4 Appendix 1 Part 3.

Regional Community Consultative Committees (RCCCs)

The practice of mining firms establishing Regional Community Consultative Committees (RCCCs) has proven to be successful in maintaining relations with the local communities and responding to social impacts and mitigation management strategies.

I have been advised by DIP that the proponent has been requested to extend their initial commitment, identified in the Supplementary EIS Appendix Z, Commitments to extend beyond the establishment of the Maranoa Regional Consultative Committee to cover each of the project components (Coal Seam Gas (CSG) field; areas impacted by the gas transmission pipeline; and the Curtis Island (LNG) facility for the project.

The proponent has responded to this request and is proposing to establish three (3) Regional Consultative Committees in the regions of Maranoa Regional Council; Central Highlands Regional Council and Banana Shire Council; and Gladstone Regional Council.

The proponent has advised DIP that Committees will be progressed in Banana and Gladstone following project approval. It should be noted that Santos will explore options to leverage off existing committees in Gladstone (should they be relevant).

Coordinator-General's conclusion

It is clearly apparent from the EIS and supplementary EIS that post EIS engagement with community stakeholders specifically on the impacts of the GLNG Project requires the establishment of a clear governance arrangement to match the broad geographic area covered by the project and the three very different components of the Project, i.e. CSG field, the gas transmission pipeline and the LNG facility. **I therefore set** Condition 5, Appendix 1 Part 3.

Resourcing of RCCC's

It is required that the proponent adequately resource the establishment of the Regional Community Consultative Committees (RCCCs) for each of the project components (Coal Seam Gas (CSG) field; areas impacted by the gas transmission pipeline; and the Curtis Island (LNG) facility for the project.

GLNG (Santos) has advised that in recognition of increased presence in the Gladstone and Maranoa regions a commitment has been made that:

- Santos has established a community shopfront in both of these regions.
- Santos has also employed community liaison officers and shopfront staff in both locations to provide a convenient access point for the local community.
- These community liaison officers will provide support to the regional consultative committees, as well as provide the central point of contact for community relations in the respective areas.
- The resources dedicated to the management of Santos' community relations are also articulated in the draft SIMP.

Coordinator-Generla's conclusion

I conclude that the resourcing of the RCCCs is necessary to demonstrate the proponents commitment to the community engagement processes which is required to successfully maintain working relationships with key stakeholders, Regional and Shire Councils, and importantly the local communities most affected by the project. **I set** Condition 6 Appendix 1, Part 3 to provide the opportunity to demonstrate partnership arrangements and in the oversight and implementation of the SIMP for the life of the project.

6.2.5 Proponent specific measures for managing social impacts

The Surat Basin Future Directions Statement includes a \$23.65M funding package for the Surat Basin and outlined ways in which local communities could work with government and industry to manage the rapid growth associated with the expected boom from the Liquefied Natural Gas industry.

I consider that a coordinated approach which promotes collaboration between the proponent, all levels of government and local communities is best to assist affected local communities to plan and fund the provision of the social infrastructure required to address future growth. **I am therefore proposing** a social infrastructure and service delivery strategy comprising four integrated elements. These integrated elements are:

1. Proponent's Commitments Register
2. Community Investment Program
3. The Social Infrastructure Strategic Plan (SISP) Gladstone; and Surat/Roma Regions
4. Specific contribution to manage social impact e.g. housing contributions.



6.2.5.1 Proponent's commitments register

In the EIS Supplementary Report—Social (D1), Commitments, the proponent has identified eleven (11) commitments for the project. **I note that** a number of other commitments are also contained in the EIS Social Impact Statement (SIA) Appendix Z. This mix of commitments creates ambiguity and requires further clarification from the proponent.

DIP has advised that the proponent has provided a copy of the Commitments for the GLNG project on 30 March 2010.

Coordinator-General's conclusion

I conclude that the proponent should provide a clear statement of commitments in relation to the potential social impacts. **I consider** it appropriate that a link is identified between the proponent's commitments and the mitigation and management of potential social impacts strategies and initiatives.

I strongly recommend that the proponent release the Commitments Register for the GLNG project so that stakeholders and the public are better informed of Santos' commitments to the project.

I am not certain that the contributions nominated in the proposed Commitments Register for Social Impacts will be the correct figures when detail project arrangements are identified with respective service providers. **I would encourage** the proponent to enter discussions with these providers and present up to date project arrangements for assessment of any changes to impact.

I do not believe that infrastructure agreements are the correct mechanism to implement the proposed Commitments Register, with the exception of the infrastructure required by DTMR. **I recommend** that the proponent consider other approaches when discussing and implementing the Commitments Register with service providers. **I set** Condition 7 Appendix 1 Part 3.

6.2.5.2 Community Investment Program

Santos has prepared some details in relation to the GLNG project's Community Investment Program (CIP). These details are contained in section 7.5 of the preliminary draft version of the GLNG Social Impact Management Plan (SIMP) provided to DIP on 17 March 2010. However, Santos has not released or consulted with other relevant parties on the draft SIMP at this stage. See Section 6.2.4.2 of this report for information on the status and conditions in relation to the release of the draft SIMP for the project.

The initial principles of the GLNG CIP have been drawn from the outcomes of the SIMP. These principles and subsequent commitment will be further refined through consultation and feedback from the Regional Consultative Committees. The initial principles of the Community Investment Program include:

Land impacts

Investment in education programs, local facilities and services which assist in managing any potential land impacts related to the GLNG project, for example- CSG water, weed management.

Social infrastructure

Investment in local services and facilities impacted by the GLNG project including health, education, social services/facilities and infrastructure. This investment should align with Regional and Strategic Plans for social infrastructure.

Housing and accommodation

Assistance and support to government in relation to projects supporting housing affordability and emergency accommodation in the event that there is a cumulative project impact.

Employment and procurement

Investment in education programs and initiatives to manage issues associated with mitigation impacts on loss of skills to the LNG industry and impacts of shift workers on local communities.

Details of the CIP contained in the draft SIMP are as follows:

Santos is committing up to \$12M to social impact mitigation initiatives inclusive of:

- Maranoa \$3M to assist Maranoa and Central Highlands RCs upgrade Arcadia Valley Road
- Maranoa \$2.5M for Roma airport terminal upgrade
- Maranoa \$2M to assist in provision of affordable housing
- Maranoa \$500K to assist in Parthenium programs
- Gladstone Region \$3.5M to assist in implementation of community health initiatives
- Queensland Police \$500K for enhanced operations and equipment purchase

Santos proposes the CIP program will be administered by a Governance Committee including senior members of the Commercial and Finance team, the Community Engagement Team and Public Affairs. The Regional Consultative Committee will be invited to provide input and recommendations to the Governance Committee.

The GLNG Governance Committee meets every second month to:

- Review and endorse community investment funding proposals
- Oversee the management of the program and ensure compliance with Santos' financial policies
- Track the implementation of approved initiatives
- Endorse periodic reports to senior management on investment outcomes.

Coordinator-General's conclusion

I acknowledge the proponent's financial and corporate commitment to allocate funding to the GLNG project's Community Investment Program (CIP) contained in its draft Social Impact Management Plan (SIMP).

I will require that the final Community Investment Program is reflected in the draft SIMP for consultation, and subsequently in the final SIMP for my approval, in Condition 8, appendix 1 Part 3.

6.2.5.3 The Social Infrastructure Strategic Plan for Gladstone

I have been advised by DIP that the Social Infrastructure Strategic Plan for Gladstone (SISP) is being undertaken as a partnership arrangement between the Department of Infrastructure and Planning (DIP), Gladstone Economic Industry Development Board (GEIDB) and Gladstone Regional Council to develop a blueprint to guide investment decisions for the future provision of strategic social infrastructure in the region, and to inform current and future major project proponents of potential contributions to social services and facilities.

The SISP project has reported on social infrastructure needs, such as the need for:

- Aged care facilities, in particular Integrated aged care (residential) facility and retirement village
- Sport and recreation including a multi-purpose complex and swimming pools
- Facilities for young people including, recreation, leisure, sporting, employment and training services
- Health services – in particular specialist medical practitioners
- Improved access to health services – transport
- A more diverse range of leisure and recreational facilities is required
- Improved public transport on weekends, and also more effectively connecting centres' across the region
- Additional educational services, in particular high schools at various centres around the region including an educational hub in Gladstone focusing on green industry
- Housing needs including more emergency housing, transitional housing and short term housing for workers on short term contracts
- Greater focus on health and well-being including opportunities for family leisure and outings, recreational facilities for all ages and family support.

A benchmarking process will audit findings, identify gaps, conduct needs assessment, and develop a costed priority schedule for social infrastructure delivery. The outputs of the benchmarking process are



intended to assist in developing a priority schedule of strategic items of community facilities required for the population of the region as a whole until 2031, distributed by catchment areas.

Coordinator-General's conclusion

I consider it important that the LNG Projects proposed for Gladstone should fully participate in the implementation of the Social Infrastructure Strategic Plan for Gladstone and **I would recommend** that the proponent consider the following:

- a) provide financial contributions to a special social infrastructure fund in which industry funds are pooled to (1) mitigate the impacts of major project developments in the Gladstone region; and (2) implement a priority social infrastructure schedule developed as part of the Social Infrastructure Strategic Plan for Gladstone Region (SISP-Gladstone);
- b) commit to an on-going investment in social facilities and services in the Gladstone region as a long term member of the community.

6.2.5.4 SISP for the Surat/Roma regions

I intend to initiate a similar process to develop a Social Infrastructure Strategic Plan (SISP) in the Surat/Roma Regions and **I will require** that LNG projects and other projects participate in its development and the implementation of its outcomes. **I therefore recommend** that the proponent consider the following:

- a) Provide financial contributions to a special social infrastructure fund in which industry funds are pooled to (1) mitigate the impacts of major project developments in the Roma Surat region; and (2) implement a priority social infrastructure schedule developed as part of the Social Infrastructure Strategic Plan for Roma Surat Region (SISP-Roma Surat);
- b) Participate as a member of a regional advisory group to implement a structure process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Roma Surat region are addressed;
- c) Commit to an on-going investment in social facilities and services in the Roma Surat region as a long term member of the community.

6.2.6 Specific contributions to manage social impacts

6.2.6.1 Housing impacts

Gladstone

Workforce housing in Gladstone will be an issue where it is important to manage social impacts. Although the intention of the proponent in this case is to house a large proportion of the workforce in Accommodation Facilities which may be on Curtis Island⁵, a proportion of the workforce will enter the housing market in the Gladstone region. GLNG indicates that its strategy for Trains 1 and 2⁶ will be to have a workforce balance of 72 per cent imported and 28 per cent local. Of the 1950 workers imported⁷, approximately 87 per cent or 1680 workers will be housed on Curtis Island, leaving some 270 of the imported workforce to be accommodated in the Gladstone Region. This will provide flexibility for housing a workforce to cover project activities which are centred on the mainland, as well as cater for those of the workforce who wish to move to Gladstone with families.

However this means that the GLNG project will have to house up to 270 of its workforce (the approximate 13 per cent of imported workforce) within the Gladstone region. At this stage the proponent is planning to

⁵ Depending on future approvals

⁶ Based on a 12 month lag time scenario from commencement of Train 1 to commencement of Train 2.

⁷ This figure represents the peak of workers required for Trains 1 and 2 being between months 30 and 40 and amounts to 1950 workers.

utilise the housing market in Gladstone, which normally supplies 400-700 new dwelling approvals per annum. There is no proposal from GLNG to arrange for workers camp accommodation on the mainland.

On the face of these numbers it is clear that at the peak of the GLNG workforce, the new dwelling approvals (400-700) will only just be sufficient to satisfy the project demand of approximately 270 workers, if that was the only project undertaken, and there was no other demand in the region for housing growth. Data on the Queensland Curtis Liquefied Natural Gas (QCLNG) project also indicates that between 285 and 475 new dwellings may be required for that project at peak, and indicates that indirect demand of an additional 248 dwellings might be experienced as a result of this project alone. The APLNG project indicates that up to 420 direct workers, who are not housed in a TWAF on Curtis Island, will be locally housed, many of them requiring new dwellings. Other projects such as the Shell Australia LNG project and Wiggins Island Coal Terminal will add to this demand if constructed in the same timeframe.

So a cumulative demand for housing in the Gladstone region directly from three of the LNG projects, which may be concurrent, could be up to $270 + 475 + 420 = 1165$ dwellings. From the timeline of GLNG, this peak builds up strongly after commencement to about 40 per cent of the peak at 18 months, and reaches a peak at 30 months and lasts at this peak until about 40 months.

The SEIS documentation of the GLNG project indicates that the consequences of cumulative demand for housing are unsustainable increases in real estate and rental values, which could see sustained high prices extend for 3 or 4 years. This would almost certainly result in undesirable social problems, particularly for low income residents who would have trouble meeting higher rental prices (i.e. suffering housing stress).

Coordinator-General's conclusion

From the EIS reports it seems that each proponent is relying on the market to supply any demand for dwellings that they or their workforce might place in the Gladstone region. Since there is rapid build-up of potential demand in the first 18 months of the project timeline,⁸ **I consider** it may be difficult for the market to accommodate such a rapid build-up of project housing, which may, on the figures above, reach 700 dwellings required at 18 months and peak of 1165 dwellings at 24 months. Past experience of the Department of Infrastructure and Planning in the Gladstone region also indicates that there can be a significant lag before the market responds to a large new demand.

I consider it is not reasonable to postulate that the normal growth pattern of the Gladstone region – currently requiring up to 700 new housing approvals per annum - will decline to make way for the separate demand from major projects. In any event the figures above show that the normal housing growth pattern only equates to the demand from a single project, not concurrent cumulative demands of several projects.

In order to mitigate the cumulative effects of pressure on housing demand of all projects happening close to the same timeframe, **I believe** it is important for each proponent to proactively take responsibility for supplying a significant part of their potential housing demand, rather than leaving it to the market.

In this way a substantial underpinning of supply should be provided to minimise the likelihood that cumulative impacts may develop. **I judge** that it should be expected that each proponent target the supply of 50 per cent or other percentage concluded from the Integrated Project Housing Strategy and approved by the Coordinator-General with advice from the Department of Communities, of its demand for housing in the Gladstone community. **I believe** that this will ease pressure, both for individual projects, and for the cumulative impacts of multiple projects.

⁸ to 40 per cent of peak



I consider that this supply should be new houses/units or remodelling to increase capacity of existing stock, rather than corporate leasing or purchase of existing properties. It might be argued that the construction demand for housing is temporary, and that requiring permanent housing stock would result in surplus stock at the end of construction. However, the targets which **I have set** would add for all projects cumulatively about 650 dwellings in 18 months, which only brings forward about one year of normal growth. After construction there will be demand for housing from operational staff, which is more permanent.

Even if all projects do not proceed concurrently **I believe** the target of 50 per cent or other percentage concluded from the Integrated Project Housing Strategy and approved by the Coordinator-General with advice from the Department of Communities, must remain for each project, as this will commence proponents on a path of being responsible for their own workforce housing requirements.

I note that the EIS indicates there is potentially a shortage of house building capacity in Gladstone. The requirement for project proponents to add to the supply of housing in the region may in fact stimulate, by the placing of sizable building contracts, the attraction of building contractors to add capacity in the region.

I note that my comments above are reinforced by a recent paper on housing produced by the Gladstone Regional Council (GRC). For the guidance of the proponent, **I reproduce** here an extract from that paper, containing suggestions on how the GRC might contribute towards an integrated housing strategy in conjunction with other stakeholders.

Project proponents should develop company policies to ensure that the island TWAF facilities and their residents have the opportunity to positively interact with the mainland community, participate in recreational and social activities and contribute to the local economy. For completeness, such policies should include purchasing arrangements that provide ample opportunity for local suppliers to service the TWAFs.

Project proponent should take a “portfolio approach” to housing needs by investing directly (developing housing stock for their own needs – management personnel etc.) and indirectly (investing on behalf of others – staff incentives, partnerships with community housing groups etc.), taking into account two important considerations:

- (a) Investment needs to be made in a “controlled” way by specifying stock requirements at price points that reflect housing trend research (eg, QGC: Draft Social Impact Mitigation Plan, (February 2010) and pre-determined increases in things like medial rental and rental vacancies.

The region needs to avoid the poor experience of a decade ago when “narrow” specifications for housing stock resulted in:

- i. The market being “cleaned out” of 4 bedroom, brick homes – whether to be occupied or not – and spiking prices in this and lesser housing categories.
 - ii. In turn, this activity sent a signal to the development community that the market demand was for solely this style of accommodation, result in a “run” of suburban expansion and failure to introduce any diversity in the new housing stock mix.
- (b) Accordingly, in making their own investments, project proponents should insist on diversity in housing stock (including higher density options, units and different built forms/sizes across a broad geographical area). This will ensure that a legacy of this period of investment will be housing diversity/choices and, in turn, a pricing hierarchy that enables a variety of consumers to participate in the market once the construction needs have passed.

Projects proponents should commit to continuing to track data/trends on housing availability and affordability and have contingency plans to activate should results prove unfavourable.

Notwithstanding the (minimum) pro-active actions sought above, project proponents need to recognise that, no matter how effective their strategies might be, there will still be movement in the market result from construction activity and resultant pressure brought to bear on some people on fixed incomes. Therefore, in addition to steps taken to satisfy their own workers' housing needs and other investments, proponents must commit to supporting organisations that provide housing support services to those people affected adversely in the housing market by industrial growth.

Roma

Roma is a small regional centre that is experiencing growth and pressure from the resource activities in the area. The proposed CSG field development will require a significant construction and operations workforce for a period of in excess of 35 years, some of which will live in Roma. The EIS and SEIS documentation have indicated the actual workforce accommodation for the CSG fields has not been finalised and will be dependant on the ultimate field development plan. It is suggested that a large proportion of the CSG field construction workforce will be imported and will be accommodated in the temporary worker accommodation facilities (TWAF's). However, the Roma centre operational workforce will live permanently in Roma. In addition, the construction workforce for the Roma and Wallumbilla fields currently live in Roma and due to the proximity of these gas field to the town this is likely to continue.

In addition, the EIS supplementary has identified that the Roma logistics hub and the Roma underground gas storage area will also bring a significant workforce into Roma. It is proposed that the imported workforce for these activities will live in a TWAF. However no details such as size and location of the TWAF have been provided.

The EIS report does not provide an indication of the numbers of workers that will live in Roma. In the absence of this information I **determine** the accommodation requirements in Roma are as follows:

Table 6.1 - Roma Accommodation Requirements

Area	2010	2011	2012	2013	2014	2019	2024	2029	2034
Roma centre	29	39	45	43	57	59	60	62	62
Roma field	62	123	185	245	245	252	260	266	270
Total workforce	91	162	230	298	302	311	320	328	332
Imported workforce ⁹ requiring housing in Roma (50 per cent of total workforce)	45	81	115	149	151	155	160	164	166
Estimated workforce relocated ¹⁰	18	11	12	11	10				
Cumulative housing requirement	63	92	127	160	161	155	160	164	166

The housing requirements are based on the following assumptions identified by the EIS report:

- workforce numbers include both Santos employees and contractor employees
- for Roma centre operation, 50 per cent of the workforce is imported employees and will live permanently in Roma
- for the Roma field operation, 50 per cent of the workforce is imported and will live in Roma
- 2 per cent of the imported workers will move to Roma in the first year, and
- 1 per cent of the imported workers move to Roma each year up to year 5.

⁹ Source: GLNG EIS Supplement – Social November 2009

¹⁰ Source: GLNG EIS Supplement – Social November 2009



Coordinator-General's conclusion

From the EIS reports it appears that the proponent is relying on the market to supply demand for dwellings that the project workforce will require. **I consider** this to be unreasonable as the annual dwelling approvals for the whole of the Maranoa Regional Council Area is less than 50 dwellings approvals per year. This is significantly less than the permanent accommodation required in Roma by the GLNG CSG field development which starts at 63 and grows to 166 dwellings per year.

The housing supply for new approvals is low (37 dwellings per annum). Thus the influx of 63 workers requiring housing most of which are expected to be for permanent operational positions, would completely swamp the new housing supply. The EIS outlines that in mid 2009 there were 200 houses for sale in Roma. It might be argued that the 200 houses for sale could supply partly or fully the project workforce requirements. However it is obvious from the 0.4 per cent annual population change in Roma that such sales are a turnover amongst existing population. Any absorption of this turnover by new settlers will mean that supply and demand will be unbalanced and result in the strong potential for price increases due to the influx of workers with secure jobs.

Therefore a strategy of 100 per cent or other percentage concluded from the Integrated Project Housing Strategy and approved by the Coordinator-General with advice from the Department of Communities, supply of housing for new settlers, whether they be Santos employees or contractor employees, is appropriate.

Therefore **I set** conditions 9 to 12, Appendix 1 Part 3 to require a proponent to provide such a housing package, by formulating an Integrated Housing Strategy for their own requirements, and for integration with other housing supply and demands at the time. **I envisage** that the Regional Community Consultative Committee (which **I recommend** be set up at each major population region) can provide oversight of the how this strategy is delivering its intended outcomes – the provision of timely housing supply, and the relief of housing pressures in the market. If there are other factors which ease or tighten supply and demand, **I envisage** that this consultative committee structure would be best placed to reflect these circumstances from the community, and advise proponents accordingly whether the housing supply which proponents are making, appear to require adjustment up or down.

While this arrangement may seem to be unstructured, in fact it has the potential to be highly adaptive and responsive to community conditions, as a formal consultative group, on which the regional council is represented, should have access to latest information on both supply and demand for housing in the region. Hence **I commend it** to proponents as a practical way in which cumulative housing factors may be managed.

In this set of conditions **I have also required** contributions towards community and affordable housing commensurate with the new settlers which the project brings to each community, Roma and Gladstone. The ratios are determined by the proportion of current housing which the EIS reported as community and affordable housing in each community.

6.2.6.2 Employment, training and impacts on local business

Local employment and training

In the EIS and SEIS submissions as detailed earlier in section 6.2, under agency issues, potential social impacts were raised in regard to employment, training and impacts on local business. In particular, the need for employment strategies and support programs that maximise employment opportunities for local disadvantaged job-seekers, under-employed people and Indigenous people, including support for job preparation and training; and potential negative impacts for local business dealing with the potential for upward pressures on local wages which may result in local employers not being able to retain employees.

GLNG Local Employment Plan

The proponent has stated that the proposed GLNG Local Employment Plan will seek to:

- optimise local community participation in the project through direct employment
- manage workforce behaviour impacts on communities
- invest in skills development of local residents that meet the needs of the GLNG project and are transferable to other LNG companies and sectors
- share risks and costs through collaborative arrangements with government and local service providers, and with lead contractors/suppliers.

The proponent indicates a commitment to continued implementation of the (Roma) School Based Indigenous Program which provides pathways for high school students into the LNG industry. The proponent reports that two (2) students in Roma are currently involved in a pilot study.

The School Based Indigenous Program explores options for partnerships with government agencies such as the Department of Education, Training and the Arts and local economic groups such as the Chamber of Commerce. The program aims to provide increased employment opportunities in the area, both with existing programs as well as options for new or additional programs.

GLNG Apprenticeship and Training Program

The proponent has indicated that an Apprenticeship and Training Program commenced in 2009 and is intended to be ongoing in the Maranoa and Gladstone Regions. Santos has advised that the Apprenticeship and Training Program for the GLNG project aims to boost local technical competency in areas of:

- safely operating and maintaining systems and equipment to extract CSG from wells
- processing gas through separation, compression and dehydration
- storing gas and pipeline transmission
- maintenance and repairs.

The proponent has advised that the preliminary draft SIMP as referred to in section 6.4 of this report, states a commitment to deliver an Apprenticeship and Training Program.

Coordinator-General's conclusion

I note that during the EIS process, potential social impacts were raised in regard to employment, training and impacts on local business, in particular, the need for employment strategies and support programs that maximise employment opportunities for disadvantaged job-seekers, under-employed people and Indigenous people in the region.

Job preparation and training programs are also required to fully equip the existing and potential workforce entering the region as well as providing support for local business operating in a changing business environment. The proponent needs to report this information in the final SIMP, and **I have set** this in Condition 13 App 1 Part 3.

Impacts of the project on local businesses

The EIS SIA Appendix Z Supplementary report states that GLNG has undertaken its employment assessment and acknowledges the potential impacts on the local employment market including:

- impacts on local businesses
- impacts on employment opportunities
- impacts on economic opportunities, and
- recognition of the current effects of low unemployment including:
 - difficulty attracting and retaining workers



- workforce turnover as a result of poached workers and
- 457 visa workers already active in the community for some jobs.

The report states that there was a potential for upward pressures on local wages which may result in local businesses not being able to retain employees.

The proponent has identified concerns in relation to the transition of workers from local business to the project. In particular, the perception that there is no local workforce employed by the project; or that the project is poaching local skilled labour to the detriment of local businesses.

In response, the proponent proposes the following mitigation strategies:

- liaise with local businesses and industry to monitor workforce impacts and collaboratively develop strategies where negative impacts are identified
- consult directly with Gladstone Regional Council to identify specific perceived and actual risks, as well as, to better assess the actual project effects on the community versus other variables like employment rates and local economic conditions
- an Apprenticeship and Training Program to boost local technical competency in:
 - safety operating and maintaining systems and equipment to extract CSG gas from wells
 - processing gas through separation, compression and dehydration
 - storing gas and pipeline transmission
 - maintenance and repairs
- Santos has indicated that its EPC contractors will employ a proportion of its workforce from outside the area.

Coordinator-General's conclusion

I agree that the large demand for workers required by the GLNG is likely to have an effect on the ability of other businesses in the area to attract and retain staff, particularly smaller businesses.

I acknowledge the concerns raised on submissions during the EIS process in regard to potential impacts on the local employment market and local businesses in the region.

In order to respond to the potential impacts identified due to the size of the project; and the potential cumulative effects of the LNG industry on the region, in particular for the Gladstone Region, **I therefore have set** imposed condition 14 Appendix 1 Part 3.

Local purchasing

The EIS has raised the issue of little local purchasing from project proponents as being perceived as a lack of investment in the community, whereas too much is perceived as draining the community's supplies to the detriment of the local community.

The proponents mitigation measure detailed in the SIA are to:

- implement a Local Procurement Policy which includes an inventory of local suppliers,
- conduct stakeholder engagement with local business owners to monitor service supply and quality and address negative impacts on local services and facilities that can be attributed to the Project,
- communicate the Local Procurement Policy to the community as well as local service providers to increase local knowledge of the projects demands and requirements, and
- encourage local businesses to bid on potential contracts, and assess requirements to meet project demand without compromising or limiting impact on the delivery of services.

GLNG Local Industry Procurement and Participation Program

In the draft SIMP, the proponent has provided further detail in relation to local industry procurement and participation.

The commitments in the SIMP indicate that Santos will develop an Australian Industry Participation Plan and that Santos procurement for the GLNG project will be in accordance with the Australian Industry Participation Plan (AIPP).

Santos has expressed a commitment to provide full, fair and reasonable opportunities for local suppliers.

The AIPP commits to:

- develop a project based communications plan for suppliers/contractors;
- procure goods and services locally;
- allow for fair and reasonable opportunities for local industry to participate in the GLNG project through:
 - registering through the Industry Capability Network (ICN) database
 - community consultation
 - consulting with Queensland ICN to identify local suppliers
 - including local clauses in all tender and contract documents

Santos has committed to continue its stakeholder engagement program to include:

- information sessions on procurement to the local business community to be organised through local business groups and industry associations such as Gladstone Engineering Alliance (GEA),
- ongoing involvement in the GEA Working Group on LNG Procurement,
- ongoing consultation with state and Local government, as well as local service providers, to monitor service supply and quality, and address negative impacts on local services and facilities that can be attributed to the project feedback through the RCCs on local business impacts and suggestions to mitigate impacts

Coordinator-General's conclusion

The proponent has expressed a willingness to directly liaise with Gladstone Regional Council to monitor employment rates and local economic conditions in the Gladstone Region which the proponent has indicated will be discussed with the Gladstone Regional Council in the development of the SIMP.

I commend the proponent for expressing a willingness to consult with the Gladstone Regional Council. However, consultation should be inclusive of all regional and shire councils affected by the project, and also include all levels of government, and the private and business sectors. This consultation should take place in relation to the development and implementation of local industry procurement and participation policies, programs and initiatives with the aim of achieving improved levels of job readiness, job creation and retention of a sustainable workforce in the region.

I consider it necessary that the proponent develop an overarching Local Industry Procurement and Participation Program to provide the linkages to cover the introduction of the LNG industry to the region, provide job transfer opportunities for the local employment market, including job creation and skill development; and address the issue of employee retention, and provide support to the local business and industry to promote a sustainable local workforce.

I require that in the design and implementation of the Local Industry Procurement and Participation Program that the proponent work collaboratively with all regional and shire councils, all relevant state government agencies, in particular the Department of Employment, Economic Development and Innovation (DEEDI), and any relevant regional or industry organisations with similar aims for local business participation.

I further require that the Local Industry Procurement and Participation Program be consistent with the principles of the Queensland Government's *Local Industry Policy* and associated Guidelines.

It is intended that the proponent be required to register its skilled workforce requirements with Rockhampton Regional Development Limited's Central Queensland Jobs Register (CQ Jobs) as part of the Local Industry Procurement and Participation Program. This Register is intended to primarily recruit



workers locally but also provides opportunities for regional and interstate workers to apply for positions that they are appropriately skilled to meet job requirements and specifications.

I **require** the proponent meet these requirements as set by Condition 15, Appendix 1, Part 3.

6.2.6.3 Community Services

The key community service and delivery issues raised in the EIS and SEIS submissions by agencies were in relation to the following matters:

Community medical and health services

The Social Impact Assessment section of the EIS, section 5.3.1 - Community Medical and Health Facilities states that:

“There are many health services available in the area, but a general consensus exists that there is not a level capable of servicing the whole community. This is particularly true of dental services. It was acknowledged that dental services were identified as inadequate; but that a new dental service is proposed for development in 2009 which might help alleviate the current requirements for dental services. THI also reports a lack of mental health services, as there is a high demand for preventative, follow-up, clinical and therapeutic services. There is also linked access to disability services in the community”

Queensland Health (QH) requested that the proponent consult with the local Health Service Districts (South West Health Service District, Central Queensland Health Service District) to discuss the capacity of health services to meet the expected demand for medical and emergency services. QH has raised concerns in regard to the capacity of health services to meet the expected demand for medical and emergency services in the Gladstone Region.

QH advises that the proponent should have in place a procedure or protocol to identify and expeditiously notify Queensland Health where an incident occurs that is likely to impact upon public health and safety.

Police service delivery

In its EIS submission, the Queensland Police Service (QPS) identified requirements for additional police resources, including staffing increases to the Central Police Region.

The submission identified the need to scope the requirement for additional police resources, including staffing increases to the Central Police Region, new police stations, specialist resources and other equipment needs. QPS were concerned about the management of incidents and complaints regarding traffic and transport movements as a result of the project; and identified resourcing implications and service delivery impacts in the affected area.

In its SEIS submission, QPS notes the additional assessment undertaken and welcomes the opportunity for dialogue with the proponent regarding impacts on police service delivery, particularly regarding the QPS water policing commitment and road safety priorities.

The proponent has indicated that it intends developing a Traffic Management Plan and Marine Safety Strategy for the project to mitigate increased road traffic and wear on road infrastructure with increase risks of traffic incidents.

Emergency services

The Maranoa Regional Council's EIS and SEIS submissions, raised concerns in relation to the EIS stating that “the impacts on emergency services assume that all emergencies will occur on site and disregards growth in the community.”

The proponent response was that “Santos experience from its existing projects is that limited use is required of external emergency services. There is no indication of a large population increase as a result of the project based on the information available at the time of submission of the EIS, including information made available from key stakeholders and Council. Accordingly, the project is anticipated to

have a low to medium impact on health and emergency services. An updated migration scenario presented in section 6.3 of Attachment D1 and based on the experiences at the Fairview operation reached the same conclusion”.

In response to the potential for increased impacts on emergency services in the region, the proponent acknowledged Maranoa Regional Council's concerns and indicated a commitment to continue to work with local emergency services staff in the region.

Social infrastructure and community services

The Maranoa Regional Council acknowledges in the SIA that the project will result in increased use of local services including health, education and social services and facilities.

The Honourable Liz Cunningham MP raised the issue of funding social infrastructure. The submission identifies that the Gladstone and Calliope regions have a population which for many years has been willing to accept and support heavy industry development. Investment by government and industry in social infrastructure is required to respond to growth and facilitate further economic growth.

It was felt that a significant under estimation of social impacts on services such as health; community services; housing; recreational facilities; education; transport; social infrastructure (built and support services) were of concern given the number of workers proposed and the potential impacts on the local hospital is felt to have a impact on service delivery.

In its SEIS submission, the Gladstone Regional Council (GRC) recognises that Santos proposes to contribute to the strengthening of local social services through various programs and initiatives, in conjunction with other projects, although no commitment or detail of this contribution or the proposed Strategic Social Infrastructure Plan is provided.

The Surat Basin Future Directions Statement forum provides one opportunity for local communities to work with government and industry to manage the rapid growth associated with the Liquefied Natural Gas industry

Coordinator-General's conclusion

I agree with the concerns raised in EIS submissions from advisory agencies relating to potential increased demands on social infrastructure and service delivery in the region.

With regard to funding social infrastructure **I have dealt** with this in sections 6.2.5.3 and 6.2.5.4 of this report by requiring participation in Regional Social Infrastructure Funds in Gladstone and Roma Surat.

I note the proponent has indicated intentions to develop a Traffic Management Plan and Marine Safety Strategy for the project to mitigate increased road traffic and wear on road infrastructure with increase risks of traffic incidents. However, **I will address** this and other transport impacts elsewhere in the report.

I require the proponent meet with the Maranoa Regional Council (MRC) to discuss concerns raised in relation to the capacity of emergency services to respond to increased demand for emergency services in relation to the growth of the community, resulting from the project.

On three specific issues, I require the proponent to address a number of potential social impacts raised in submissions to adequately mitigate these potential social impacts on service delivery in the region. These relate to potential:

- impacts on community medical and health services and facilities; and incidents response and management related to public health and safety
- impacts on police service delivery, water policing and management of traffic and transport movements



- emergency services planning and incident response management due to anticipated population growth.

Therefore I **set** conditions 16, 17 and 18 Appendix 1, Part 3 to require a proponent to adequately respond to the identified social impacts identified in the EIS process.

6.3 Greenhouse gases

I acknowledge that anthropogenic greenhouse gas (GHG) emissions are broadly accepted as the major contributing factor to global warming.

6.3.1 Greenhouse gas estimates

I find that the major sources of direct GHG emission from the GLNG project are from the operation of the LNG facility and the CSG field activities. These sources include fuel consumption in process equipment; fuel consumption in vehicles; power generation; fugitive emissions; flaring and venting; and land clearing.¹¹ The main GHGs emitted during the activities of the GLNG Project will be carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O).¹²

I find that the estimate of direct (i.e. Scope 1)¹³ GHG emissions for the GLNG Operations totals approximately 66.45 million tonnes of carbon dioxide equivalents (MtCO₂-e) over 25 years (for the 3 Mtpa case, i.e. 1 LNG train).¹⁴

I find that the estimate of average annual direct (i.e. Scope 1)¹⁵ GHG emissions for GLNG Operations totals 2.65 MtCO₂-e per year (for the 3 Mtpa case), and 7.19 MtCO₂-e per year (for the 10 Mtpa case).¹⁶ **I note** that this estimate is after high-efficiency and other mitigation measures¹⁷ have been incorporated into project design engineering, and does not include GLNG construction or indirect GHG emissions (i.e. Scope 2¹⁸ and 3¹⁹) such as transportation and use (combustion of LNG).²⁰

I note that a Scope 1 contribution of 7.19 MtCO₂-e per year represents approximately 2.17 per cent of the Australian Government's National long-term GHG emissions reduction target for 2050²¹. **I therefore find** that operation of the GLNG project will generate significant GHG emissions. The expected average annual emissions (Scope 1) from project operation, as a percentage of Australia and Queensland emissions in 2006, is provided in the table below²²:

Table 6.2 - Expected annual GHG Emissions

Emissions in 2006	Total emissions MtCO ₂ -e	GLNG Stage 1 or 3 Mtpa (2.65 MtCO ₂ -e/yr)	GLNG Stage 3 or 10 Mtpa (7.19 MtCO ₂ -e/yr)
Queensland energy sector	94.9	2.79 per cent	7.58 per cent
Total for Queensland	170.9	1.55 per cent	4.21 per cent
Australian energy sector	400.9	0.66 per cent	1.79 per cent
Total for Australia	576.0	0.46 per cent	1.25 per cent

¹¹ Source: SEIS, Attachment J - Cumulative Impacts, p.49.

¹² EIS, Section 6.9

¹³ Scope 1 incorporates direct greenhouse gas emissions from sources owned or controlled by the reporting entity.

¹⁴ Source: SEIS, Part 3, Attachment K - Greenhouse Gas Emissions, Table 5, p. 7.

¹⁵ Scope 1 incorporates direct greenhouse gas emissions from sources owned or controlled by the reporting entity.

¹⁶ Refer to SEIS, Section 5.1, Table 3.

¹⁷ Mitigation measures incorporated into project design are outlined in SEIS Attachment K – Greenhouse Gas, p.9.

¹⁸ Scope 2 incorporates indirect greenhouse gas emissions from the generation of purchased energy products (e.g. purchase of electricity). Source: SEIS, Section 5.1.

¹⁹ Scope 3 incorporates indirect greenhouse gas emissions that are a consequence of the activities of the entity but arise from sources not controlled by the reporting entity (e.g. transportation and combustion of LNG). Source: SEIS, Section 5.1.

²⁰ As another comparison, National Greenhouse Gas Inventory total emissions for Queensland in 2000 (based on Kyoto Accounting) was 163,719.01 Gg of CO₂-e.

²¹ The target is set at 60 per cent below 2000 levels. This equates to 331,608,288 tonnes CO₂-e.

²² Source: SEIS, Part 3, Attachment K - Greenhouse Gas Emissions, Table 8.



The estimate of direct (i.e. Scope 1) greenhouse gas emissions for the construction of the GLNG totals 109,683 tCO₂-e (for the 3 Mtpa case). **Therefore, I find** that the construction of the project will also generate significant GHG emissions.

I find that the estimate of average annual Scope 3²³ (i.e. indirect) GHG emissions for GLNG Operations totals approximately 29.4 MtCO₂-e per year (for the 10 Mtpa case). Thus, the majority of GHG emissions for the GLNG project are indirect emissions generated by the transportation and end use (specifically, electricity generation and retail use) of LNG²⁴.

6.3.2 Mitigating greenhouse gas emissions

I note that the GLNG greenhouse gas estimates summarised above are expected following the incorporation of high-efficiency production and processing methods, and other mitigation measures²⁵, into project design.

According to the EIS, GHG mitigation measures incorporated within the LNG Facility design include: running high-efficiency compressor and power generation turbines on CSG; use of boil-off gas as fuel; high-efficiency gas liquefaction processes that minimise flaring of gas; solvents for CO₂ removal that minimise release of methane (CH₄); aeroderivative turbines (offering higher thermal efficiency and improved fuel efficiency compared to traditional turbines); minimising flaring and venting of gases; and converting GHG content of released methane to CO₂, thereby reducing emissions by 21 times²⁶.

GHG mitigation measures incorporated within the Gas Field and Transmission Pipeline components include: gas fired pipeline compressor station engines; and field operation protocols designed to minimise flaring, venting and other emission sources²⁷.

I note that overall GLNG project GHG efficiency figures provided by the proponent²⁸, forecast a Scope 1 (direct) emissions intensity of 0.88 tCO₂-e / tLNG, and a Scope 3 emissions intensity of 0.72 tCO₂-e / tLNG.

The GLNG Plant efficiency comparisons provided by the proponent²⁹ indicate that the project compares favourably with other LNG projects, with an estimated overall GHG emissions intensity of 0.35 tCO₂-e / tLNG. In addition, **I note** that the proponent has stated that its operational electrical energy requirements will, almost exclusively, be generated directly from its own natural gas.

6.3.3 Legislation and policy considerations

Australian Government

I acknowledge that on 3 December 2007, the Prime Minister of Australia signed the instrument of ratification of the Kyoto Protocol, and on 11 March 2008 Australia's ratification came into effect. **I note** that under the agreement, Australia has agreed to cut GHG emissions during the period 2008-2012 to 108 percent of the levels they were in 1990 (i.e. eight percent more than they were in 1990).³⁰

In addition, **I note** the Australian Government has set National targets committed to reduce Australia's carbon pollution to 25 per cent below 2000 levels by 2020 if the world agrees to stabilise levels of GHG in the atmosphere at 450 parts per million CO₂ equivalent or lower. If the world is unable to reach

²³ Scope 3 incorporates indirect greenhouse gas emissions that are a consequence of the activities of the entity but arise from sources not controlled by the reporting entity (e.g. transportation and combustion of LNG). Source: SEIS, Section 5.1.

²⁴ The SEIS states that it is highly probable that LNG from the GLNG project will be exported to Asia (Japan, China or Korea).

²⁵ Mitigation measures incorporated into project design are outlined in SEIS Attachment K – Greenhouse Gas, p.9.

²⁶ Source: SEIS, Attachment K – Greenhouse Gas Emissions, p. 9.

²⁷ Source: SEIS, Attachment K – Greenhouse Gas Emissions, p. 9.

²⁸ Refer to SEIS, Attachment K – Greenhouse Gas Emissions, p. 16.

²⁹ Refer to SEIS, Attachment K – Greenhouse Gas Emissions, Figure 2.

³⁰ Source: Australian Government Department of Climate Change and Energy Efficiency
<http://www.climatechange.gov.au/en/government/national-targets.aspx>

agreement on a 450 parts per million target, Australia has committed to reduce its emissions by between 5 and 15 per cent below 2000 levels by 2020.³¹

I note that greenhouse gas emissions from the oil and gas sub-sector are projected in the recent Australian Government report *Tracking to Kyoto and 2020: Australia's Greenhouse Emissions Trends 1990 to 2008 - 2012 and 2020* (Department of Climate Change, 2009). The projections³² forecast that GHG emissions from the oil and gas sub-sector are to reach 25 Mtpa by the year 2020 and will continue to rise rapidly. The rate of increase suggests that the oil and gas sector is potentially the fastest-growing contributor of GHG emissions in Australia.

Importantly however, **I note** that the Department of Climate Change projections do not appear to include the Queensland CSG LNG industry. The report states³³ that “a number of potential LNG projects based on coal seam methane have not been included, because coal seam methane has an intrinsically low CO2 content and so these projects, if built, will not have a material effect on Fugitive³⁴ emissions.” **I find** that, based on the information presented in the EIS for the GLNG project, the emerging Queensland CSG LNG industry will significantly increase previous projections of GHG emissions from the Australian oil and gas sub-sector.

Queensland

I note that the administering authority under the *Environmental Protection Act* 1994 (EP Act) must consider GHG emissions when deciding an application for environmental authority for petroleum activities (and other environmentally relevant activities), and may impose conditions such as requiring offsets (including GHG offsets) for such activities.

Further, I note that pursuant to the EP Act, the Kyoto Protocol is an example of an ‘*applicable government agreement*’ that requires consideration, together with the principles of ecological sustainable development and other important matters, specified under the set of ‘*standard criteria*’ for assessments and decision-making regarding whether or not to approve environmental authorities for petroleum activities in Queensland.

In addition, I note that other ‘*standard criteria*’ to be considered pursuant to the EP Act include the character, resilience and values of the receiving environment, and any applicable environmental impact study, assessment or report. The legislation therefore obliges the delegate of the administering authority to consider publicly available and accepted scientific reports about the current state of global warming, the accepted contributing factors (i.e. GHG emissions), and the likely future impacts to the environment and future generations (socially and economically).

I note that the Queensland Minister for Climate Change and Sustainability recently approved a draft policy statement outlining the proposed approach for consideration of GHG emissions under the *Environmental Protection Act* 1994.

³¹ Australian Government Department of Climate Change and Energy Efficiency

<http://www.climatechange.gov.au/en/government/national-targets.aspx>

³² Source: *Tracking to Kyoto and 2020: Australia's Greenhouse Emissions Trends 1990 to 2008 - 2012 and 2020*, Department of Climate Change, Australian Government, 2009, p.45, Figure 19.

<http://www.climatechange.gov.au/en/government/~media/publications/projections/tracking-to-kyoto-and-2020.ashx>

³³ Refer to p. 45 of *Tracking to Kyoto and 2020: Australia's Greenhouse Emissions Trends 1990 to 2008 - 2012 and 2020*, Department of Climate Change, Australian Government, 2009.

³⁴ The Fugitive sector covers emissions that are associated with the production, processing, transport, storage, transmission and distribution of fossil fuels. (Source: *Tracking to Kyoto and 2020: Australia's Greenhouse Emissions Trends 1990 to 2008 - 2012 and 2020*, Department of Climate Change, Australian Government, 2009, p.41)



6.3.4 Coordinator-General's assessment and conclusions

I note that when used for power generation, natural gas generates less than 50 per cent of the greenhouse gas emissions associated with coal-fired power. However, **I acknowledge** that coal-fired power generation is continuing.

Coordinator-General's conclusion

In an effort to mitigate the carbon footprint of both the construction and operation of this project **I impose** Condition 4 - Greenhouse Gas Emissions Strategy in Appendix 1 Part 1 requiring the proponent to develop and implement a greenhouse gas reduction strategy for the project. The strategy must include, but not be limited to, the company's policy on greenhouse gas emissions, an energy efficiency program, a continuous improvement program, better control systems and a CO₂ recovery plan. The strategy must be submitted to the Coordinator-General for approval within three months of the granting of the petroleum facilities licence for the LNG facility.

6.4 Cumulative impacts

6.4.1 Introduction to cumulative impacts

This introduction makes some general remarks on the concept and delivery of cumulative impact analysis in all of the three LNG project EIS reports that have been delivered to me from LNG proponents by the date of this report. **I am providing** this commentary because the concept of cumulative impacts needs to consider impacts from other projects which may develop concurrently and therefore overlap in impacts. Therefore each project needs to consider the others in its assessment, to the extent that the impacts interact with each other and some additional form of mitigation needs to be taken.

The concept of cumulative impacts with relation to an EIS for a project is often misunderstood. In the context of a significant project EIS the definition of cumulative impacts is meant to describe the interactions if any between one project and another in proximity of time and location. The terms of reference for LNG projects which **I have declared** significant included the following scope of cumulative impacts:

"...cumulative impacts should take into consideration the effects of other known, existing or proposed projects ... the likelihood of cumulative impacts arising from shared gas pipeline easements and adjoining or nearby LNG plants...the cumulative social and economic impacts arising from large project workforces associated with proposed industrial projects being constructed in overlapping timeframes ...the additional impacts on population, workforce, accommodation, housing, use of community infrastructure and services...to the greatest extent practicable."

Thus the Terms of Reference clearly focussed on the overlapping effects of the project and other projects including proposed projects. They also directed proponents towards the potential for overlap of adjacent pipelines and the LNG plants (as they were generally proposed to be located in the same precinct). Lastly and not least the ToR directed proponents to examine the social and economic cumulative effects occasioned by the significant workforces which are anticipated to be present in the same space at the same time, and specified certain aspects of social and workforce impacts to be reported upon.

By and large, project proponents in their EIS reports have had difficulty describing and analysing cumulative impacts. Some merely described the sum of impacts of the project itself as cumulative. Others considered other projects in comparison to their own, and judged which has the greater impact. In almost all cases the cumulative impact is described qualitatively, and is not quantified.

The true measure of the cumulative impact being sought by the ToR is to identify situations where overlapping impacts lead to interactions which generate a different character or a more intense effect than they do alone, i.e. the cumulative effect is more than the sum of the parts.

For example; gas emissions from each project individually may not overload the air shed, but when two or more are modelled, the cumulative effect may be to raise the total emissions and pollution level above the limit defined by acceptable health or safety criteria.

Another example is transport; where each of the projects may not overload the road network, or a particular intersection, but additional projects can provide impacts which when totalled, form such a large increase that the result is lower service standards on roadways or intersections require upgrading, as a result of the accumulation.

From these examples it is clear that cumulative impact analysis should address the following matters

- (a) there must be some proximity in time and /or location for projects to interact,
- (b) there must be a mechanism or opportunity for the interaction,
- (c) the assessment must identify an impact different from or additional to the sum of the collective projects, and
- (d) mitigation is required that may be additional to other measures.

While cumulative impacts analysis should meet these tests, it should be clear that individual project impacts for any action of the project will be dealt with by mitigation measures that are specific to that action. In many cases these measures will manage impacts to the extent that a cumulative impact is not experienced.

One limitation to analysis raised by proponents, is where a known project, especially one which is of the same character as others, is not included in the assessment *“because it has not published its EIS”*. This limitation requires more discussion for future EIS projects, especially significant projects, between government and the development industry proponents and consultants. Other projects such as the APLNG EIS also discussed the limitation of information contained even in prior EIS reports, as making it difficult to quantify the exact nature of total impacts. The APLNG EIS indicated that *“reporting [in previous EIS reports] provides limited data on how much habitat will be lost, which habitat types will be affected, the severity of impacts, and mitigation and offset measures.”*

One option for analysing this issue is to require an audit of cumulative impacts at a later date, together with a comparison of the qualitative impacts which are discussed here and in proponent’s EIS reports with actual outcomes. **I have not yet determined** whether this is a course which would yield valuable results. **I would wish** to receive industry and agency advice on the difficulties that may arise and benefits to be gained from a post-project audit before coming to any conclusion on this matter.

Despite the potential for limitations mentioned above, **I am now** in possession of impact information from the EIS Report of three LNG projects which are reporting to me. Each has produced an assessment of cumulative impacts in response to the same TOR. With this background **I believe I am in a position** to evaluate the information from all three, as well as advice from agencies and other submissions, and **I am able** to draw conclusions on the potential for Cumulative Impacts from the GLNG project.

6.4.2 Analysis of LNG projects EIS reports

The following table indicates the numbers of projects considered by each proponent, in each of the three segments of the LNG project.

Table 6.3 - Number of projects considered in suite of cumulative impact projects

Proponent	GLNG	QCLNG	APLNG
Gas Field	6 projects	11 projects	27 projects
Pipeline	14	11	27
LNG Plant	12	11	15
Other LNG projects	QCLNG APLNG partly, Arrow pipeline	GLNG	GLNG, QCLNG, Arrow pipeline



While this should not be taken to suggest that fewer projects will yield lesser cumulative impacts, the important projects to analyse are those which have the greatest interaction with the subject project. Clearly other LNG projects overlapping in time and location with the proponent's project are most likely to have cumulative impacts. In the case of the GLNG project the cumulative impact assessment considered aspects of the QCLNG project, and qualitatively discussed relativities to the APLNG project, since it was yet to publish its EIS details.

I have reviewed the above lists and consider that they cover the scope of known projects which might impact on the three LNG projects because of proximity and timing. The only limitation is the lack of specific details of the Shell Australia LNG project, which was not formulated until almost at the end of the EIS report period, hence was not predicted in the analysis.

6.4.3 Gas fields cumulative impact assessment

Issues of concern

For the reasons expressed above in my introduction, **I have decided** to look at how three LNG significant projects assessed the range of aspects considered. Hence the following table was created from the EIS reports now published by the LNG proponents:

Table 6.4 - Gas fields cumulative impact assessment summary

Aspect	GLNG	QCLNG	APLNG
Land/ Soils	Low	Minor	Moderate
Land Use	Medium	Minor	
Land Contamination		Minor	
Terrestrial Ecology	Low	Moderate	Moderate
Aquatic Ecology	Medium	Moderate	Moderate
Marine Ecology	-	-	-
Surface Water	Low	Minor	Moderate
Groundwater	Medium	Moderate	High
Associated Water	Low		High
Air Quality	Low	Moderate	Low
Greenhouse Gas	-	-	High
Noise and Vibration	Low	Major localised	Low
Economic			High
Social and Community	Medium	Not rated	High
Traffic and Transport	Medium	Major	Moderate
Solid Waste	Medium	Moderate	Moderate
Visual Amenity	Low	Medium	Moderate
Cultural Heritage	Low		Low
Hazard and Risk	Low	Minor	Low

The highlighted topics are ones which **I believe** contain a higher degree of cumulative impact potential than the others, even though other topics may have multiple impacts at a smaller scale.

Responses by proponents

GLNG assesses its terrestrial ecology interaction impacts as low because it considers that small areas are involved, and there are not many species overlaps with other projects. The major ones are brigalow, and semi evergreen vine thicket, for which the GLNG and QCLNG projects are claimed to account for clearing of 0.03 per cent and 0.16 per cent respectively of these communities in the bioregion. APLNG indicates that its total clearing footprint will only take about 0.5 per cent of the vegetated area in its potential gas field, but that the nature of the grid of wells and connecting pipelines and roads may cause fragmentation of some vegetation types. A focus on maintenance of corridors should therefore be a

feature of Environmental Management Plans, as well as the standard mitigation approach of minimisation of clearing and provision of offsets.

Noise and Vibration assessments by GLNG show that their low rating is because the gas field facilities are not within interaction distance of other projects or towns likely to be impacted. Yet QCLNG does have the potential for proximity to other gas field facilities of other projects in its area (but not GLNG).

Likewise for traffic and transport impacts, GLNG gas fields are removed somewhat from other projects but since the fields are ultimately supplied with materials of construction using the Warrego Highway, some increased impact will be experienced for some highway transport tasks which travel outside the immediate field areas. The EIS presents a table of traffic volumes for GLNG and QCLNG, but does not include figures for APLNG which will have some fields between and hence will contribute to some cumulative impact beyond what is identified in the GLNG EIS.

GLNG indicates that it will commit to, and expects that each proponent will commit to, negotiating a suitable contribution package on roads affected, to mitigate both project impacts and cumulative impacts.

The GLNG EIS report discusses cumulative social impacts by indicating that its workforce will be largely imported into the region and housed in Temporary Workers' Accommodation Facilities in the fields which are relatively remote from the major centre of Roma. The EIS points out that other projects will be located near other centres well to the east of Roma and so cumulative impacts with the GLNG project will be relatively low. Social impacts of the GLNG project are discussed elsewhere in this report.

Coordinator-General's conclusion

No other LNG gas field development overlaps or is directly adjacent to the GLNG fields. Other projects, such as a mine (adjacent) and a future rail corridor (passing through a future field development area) are localised in area and land disturbance cumulative effects are limited.

There will be some localised transport and traffic interaction and these will be managed in conjunction with Regional Councils. **I have provided** a condition in the transport section of this report – Condition 10, Appendix 1 Part 2 to require the proponent to produce Road Management Plans and enter infrastructure agreements with local authorities on roads, which will enable any interaction to be managed.

I am concerned that road safety is an issue that accompanies cumulative transport and traffic increases as a result of these projects. **I have ensured** elsewhere in this report that it is an issue included in Social Impact Management Plans of proponents and their contractors, so that they take responsibility in a formal way for ensuring that it is a management objective in operating their projects.

Not only will local road impacts be important, but there are wider cumulative effects on transport on state roads such as the Warrego Highway. **I have determined** a condition in the transport section of this report, requiring proponents to participate in and implement the findings of a cumulative road impacts study which will take into account all LNG and other project related transport impacts, This condition will address state roads impacts in the Surat region, as well as the Gladstone region.

On a regional basis there is a potential for individual vegetation clearance activities not to consider bioregional corridors. **I need to ensure** that this is a focus of management planning in field development and so **I have included** it in a Condition 15 Appendix 2 Part 2 affecting the finalisation of Environmental Management Plans.

The DERM is the responsible agency for this condition.

I will consider the questions of cumulative transport and threatened species issues again, taking account of these proposed gas field developments, when **I am considering** the Wandoan Mine and Surat Rail projects which are also significant projects currently undergoing assessment under the *SDPWO Act*.



6.4.4 Pipeline cumulative impact assessment

Issues of concern

For the reasons expressed above in my introduction, **I have decided** to look at how three LNG significant projects assessed the range of aspects considered. The following table was created from the EIS reports now published by the LNG proponents:

Table 6.5 - Pipeline—cumulative impact assessment summary

Aspect	GLNG	QCLNG	APLNG
Land/ Soils	Medium	Negligible	
Land Use	Low	Negligible	Low
Land Contamination		Negligible	
Terrestrial Ecology	Medium	Negligible-minor	Moderate
Aquatic Ecology	Low	Minor	Low
Marine Ecology	High	Significant	Low
Surface Water	Low	Negligible	Low
Groundwater	Low	Negligible	-
Associated Water	-	-	-
Air Quality	Low	Negligible	Low
Greenhouse Gas	-	-	High
Noise and Vibration	Low	Negligible	Low
Economic			High
Social and Community	Low	Not rated	High
Traffic and Transport	Low-Medium	Moderate- Major (Minor after management)	Moderate
Solid Waste	Low	Minor	Moderate
Visual Amenity	Low	Negligible	Low
Cultural Heritage	Low		Low
Hazard and Risk	Low	Negligible	Low

The aspects with increased cumulative impacts are highlighted in the above Table.

Responses by proponents

The GLNG pipeline route is for the most part well separated from other LNG project pipeline routes and so cumulative impacts are largely absent. The GLNG generally follows an existing gas pipeline, the Queensland Gas Pipeline, north from the fields then east to the Callide Range area. It is here that all LNG project pipelines enter the Callide Infrastructure Corridor, and so it is here that co-location cumulative impacts may be experienced.

GLNG and QCLNG have identified a high cumulative impact on Marine Ecology, while APLNG rates it as Low. This seems to arise largely from APLNG's proposal in the EIS to directionally drill under the Narrows crossing of Port Curtis waters, thereby minimising impacts, and not participating in dredging of pipeline crossings of Port Curtis. However they observe that if their crossing had to be done by conventional dredging then the impacts would be larger, and a cumulative impact of three independent dredged crossings would be high impact.

Coordinator-General's conclusion

For the last 80 kilometres of the pipeline route to Gladstone, all pipelines traverse the Callide Infrastructure Corridor which has been designated by the government as a State Development Area for the purpose of co-locating pipelines and other linear infrastructure. The rationale for this is to enable a coordinated and timely approach to landholders both in the planning and the implementation stages of pipeline development. It avoids repeated consultation, negotiation and decision making amongst landholders and proponents. It more efficiently assesses and optimises land disturbance with multiple proponents and landholders.

Hence **I endorse** the Callide Infrastructure Corridor approach, and **I note** that pipeline alignments are generally settled in this corridor. **I note** that a pipeline corridor extends through the Gladstone State Development Area traversing the northern boundary of the area and arriving at the Narrows.

However co-location of pipelines in the CIC has other cumulative impacts that might be experienced. During construction there will be a longer period of transport on access roads and potential for road damage, as well as congestion and reduction of service standards at intersections due to the size and frequency of transport for multiple projects. This needs appropriate study of cumulative impacts, and will likely require specific mitigation strategies.

I am not convinced that studies done by proponents in their EIS are sufficiently comprehensive of cumulative impacts from pipeline transport to take into account all multiple project impacts on such roads, and for the arterial roads and highways from ports to the pipeline route. Therefore, **I have set** (in the Transport section of this report) Condition 9, Appendix 1 Part 2 requiring proponents to participate in and implement the findings of a cumulative road impacts study which will take into account all LNG and other project related transport impacts for servicing the pipeline corridor in the Gladstone region as well as in the Surat region.

Both the QCLNG and APLNG EIS reports make a strong case that, on the basis of the apparent high cumulative impacts of multiple dredging projects for the crossing of 3 pipelines (which could be up to 1 kilometre wide), a 'bundled' crossing should be undertaken with the obvious benefit of reducing cumulative impacts.

I support this view and **declare** that **I require** proponents to investigate a bundled pipe crossing based generally on a proposal which was prepared by the industry in February 2010. A discussion and conclusion on this subject is dealt with in a separate section of this report and a condition is provided at Condition 23, Appendix 2, Part 2. The objective of the condition is to ensure that all proponents may have the opportunity of participating in a method of pipeline crossing which both minimises the cumulative impacts of multiple pipeline crossings, and which ensures that each proponent can achieve a pipeline solution in time to service their project.

6.4.5 LNG plant cumulative impact assessment

Issues of concern

For the reasons expressed above in my introduction, **I have decided** to look at how three LNG significant projects assessed the range of aspects considered. Hence the following table was created from the EIS reports published by the LNG proponents:

Table 6.6 - LNG plant—cumulative impact assessment summary

Aspect	GLNG	QCLNG	APLNG
Land/ Soils	Medium	Minor	Low
Land Use	Low	Minor	
Land Contamination	Medium	Negligible	
Terrestrial Ecology	Medium	Moderate	Moderate
Aquatic Ecology	Low	-	Low



Marine Ecology	High	Significant potential	High
Coastal Environment		Minor	High
Surface Water		-	Low
Groundwater	-	-	-
Air Quality	Low	Minor	Low
Greenhouse Gas	Medium	-	High
Noise and Vibration	Low	Minor	Low
Economic			High
Social and Community	High	Not rated	High
Traffic and Transport	Medium	Moderate	Moderate
Solid Waste	Low	Minor	Low
Visual Amenity	High	Moderate to Major	Low
Cultural Heritage	Low		Low
Hazard and Risk	Medium	Minimal	Low

The table indicates that cumulative impacts will be mostly present in respect of Marine Ecology, social and community, and traffic and transport.

Responses by proponents

Marine Ecology effects are stated by all proponents as High impact. This reflects the inclusion of the Western Basin Dredging in the proponent's assessment. If separate dredging projects are undertaken, impacts might be heightened by the potential for simultaneous coastal and dredging works and consequent multiple activities and equipment being employed. This would lead to concentration of impacts, and perhaps a higher peak.

However it has been determined that the dredging for each of the proponent's channels, swing basins and berths should be undertaken as a single project under the control of the Gladstone Port Corporation. Hence the Western Basin Dredging project will conduct the dredging as a consolidated consecutive program, so that multiple dredging activities are avoided, with consequent elimination of cumulative impacts.

From the figures in the SEIS cumulative impacts study for GLNG, the extent of marine habitat affected (mangrove, seagrass and saltmarsh) is a low percentage of the size of these habitats in the Port Curtis area. Nevertheless an appropriate offset program will be put in place for the impacts of the Western Basin Dredging project.

Despite the minor rating for air quality and coastal environment, cumulative modelling for these impacts has not been done for all four LNG projects on Curtis Island and the project on Fishermans Landing. The proponent has cited lack of information from a published EIS.

Workforce housing in Gladstone will be an issue where it is important to examine cumulative impacts. Although the aim is to house a large proportion of the workforce in Temporary Workers' Accommodation Facilities which may be on Curtis Island, a proportion of the workforce will enter the housing market in the Gladstone region. GLNG indicates that its strategy for trains 1 and 2 will be to have a workforce balance of 72 per cent imported and 28 per cent local. Of the 1950 workers imported, approximately 87 per cent or 1680 workers will be housed on Curtis Island, leaving some 270 of the imported workforce to be accommodated in the Gladstone Region. This will provide flexibility for housing a workforce to cover project activities which are centred on the mainland, as well as cater for those of the workforce who wish to move to Gladstone with families.

Coordinator-General's conclusion

In order to review the cumulative impacts of air and water emissions from all LNG plants around Port Curtis, I **require** the proponent to update its cumulative impacts on these factors, by setting Condition 1 Appendix 4 Part 3.

Other LNG projects potentially will also require workforce housing in the Gladstone area. It is a subject which has important social impacts and has been raised actively by the Gladstone Regional Council. Therefore **I will deal** with this issue more completely in the Social Impact section of this report.

Elsewhere in this report, in the Social Impact section, **I have set** conditions (Conditions 9-12 Appendix 1 Part 3) to require a proponent to provide a housing package, in the context of an Integrated Housing Strategy for their own requirements, and for integration with other housing supply and demands at the time. **I envisage** that the Regional Community Consultative Committee (which **I recommend** be set up at each major population region) can provide oversight of how this strategy is delivering its intended outcomes – the provision of timely housing supply, and the relief of housing pressures in the market. If there are other factors which ease or tighten supply and demand, **I envisage** that this consultative committee structure would be best placed to reflect these circumstances from the community, and advise proponents accordingly whether the housing supply which proponents are making, appear to require adjustment up or down.

While this arrangement may seem to be unstructured, in fact it has the potential to be highly adaptive and responsive to community conditions, as a formal consultative group, on which the regional council is represented, should have access to the latest information on both supply and demand for housing in the region. Hence **I commend** it to proponents as a practical way in which cumulative housing factors may be managed.

Transport cumulative impacts need to be investigated because, although one project may not trigger road upgrades, or a drop-off in service standards, the cumulative effects of three or four significant projects utilising road infrastructure concurrently, or even consecutively, may cause overloading of capacity. This could potentially result in congestion or pavement impacts, negatively impacting on road safety and trigger the need for mitigation and road upgrade works.

To ensure present proposals include appropriate impact mitigation, road contribution strategies for a number of scenarios which take account of the number of proposed projects, construction schedules, timing and transport tasks, **I have initiated** a proposal that DIP, in conjunction with DTMR, conduct a Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts. **I will be seeking** contributions from all LNG industry participants in order to ensure that a full assessment will be conducted on the same basis, to determine whether cumulative impacts will arise, and what mitigation strategies will be required. **I have included** a condition to this effect in the transport section of this report.

6.5 Offsets

The proponent has provided an Environmental Offset Strategy (Ecofund Queensland, 3 March 2010)³⁵ an offset proposal (April 2010)³⁶ for the GLNG project, including an assessment of requirements in relation to:

- vegetation management offsets under the *Vegetation Management Act 1999* (Qld)
- biodiversity offsets under the draft Policy for Biodiversity Offsets 2008 (Qld)
- protected plan offsets under the *Nature Conservation (Protected Plan) Conservation Plan 2000* (Qld)
- marine fish habitat offsets under the *Mitigation and Compensation for Works and Activities Causing Marine Fish Habitat Loss 2002* (Qld)
- flora fauna and ecological community offsets under the Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

An evaluation of environmental offsets under the EPBC Act is provided in the Matters of National Environmental Significance section of this Coordinator-General report.

³⁵ Refer to Environmental Offsets Strategy for the GLNG Project, prepared by Ecofund Queensland in conjunction with and based upon information provided by Santos, 3 March 2010.

³⁶ Refer to *GLNG Environmental Offsets Proposal Summary Report, April 2010*.



Gas fields

I note that the environmental offsets strategy has determined that a total of 147 ha of regional ecosystems and essential habitat under the *Vegetation Management Act 1999* require offsetting for the gas field development.

Table 6.7 - Sensitive regional ecosystem disturbed by gas field development

Regional ecosystems	Description	Status	Proposed clearing area (ha)
11.4.3	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> shrubby open forest on Cainozoic clay plains	Endangered	3.3
11.9.4	Semi-evergreen vine thicket on fine-grained sedimentary rocks	Endangered	0.8
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	Endangered	16.3
Sub-total			20.4
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of Concern	108.9
11.3.17	<i>Eucalyptus populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of Concern	12.6
11.9.7	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks	Of Concern	1.3
Sub-total			122.8
Essential habitat			
Regional ecosystem	Description	Species	Proposed clearing area (ha)
11.9.4 / 11.10.1 / 11.10.13	Semi-evergreen vine thicket and open woodland to open forest	<i>Apatophyllum teretifolium</i>	1
11.10.1	<i>Corymbia citriodora</i> predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30m high).	<i>Acacia calantha</i>	2.8
Sub-total			3.8
TOTAL			147

I note that no fish habitat areas under the *Fisheries Act 1994* are proposed to require offsetting for the gas field development.

Regarding protected plants under the *Nature Conservation Act 1992*, I note a total of 3.8 ha of protected plant habitat is proposed to be cleared, and a total offset requirement of 7.6 – 10.8 ha has been

determined for the gas field development (refer to table below). **However, I note** that as species occur in similar habitats, offsets are proposed to be co-located.

Table 6.8 - Protected species disturbed by gas field development

Species	NC Act status	Habitat type	Proposed clearing area (ha)	Offset requirement with ratio (ha)
<i>Acacia calantha</i>	Rare	Semi-evergreen vine thicket and open woodland to open forest	2.8	5.6 – 7.8 (2:1 – 3:1)
<i>Apatophyllum teretifolium</i>	Rare	Corymbia citriodora predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30m high).	1	2 -3 (2:1 – 3:1)
Total				7.6 – 10.8

Regarding biodiversity offsets for the gas field development, requirements are based on the clearing of regional ecosystems that support habitat for threatened fauna species under the *Nature Conservation Act* 1992. As species occur in similar habitats, offsets can be co-located, and thus offset requirements are not presented as a cumulative total, rather per species habitat area, as follows:

Table 6.9 – Protect fauna species habitat disturbed by gas field development

Species	NC Act and EPBC Act status	Habitat type	Proposed Clearing Area (ha)	Offset requirement with ratios (ha)
Northern Quoll	Endangered	Rocky escarpments, open forest and open woodland	100.1	400.5 – 500.6 (4:1 – 5:1)
Large-eared pied bat, large pied bat	Vulnerable	Will forage adjoining woodlands and clearings	108.1	270.3 – 378.4 (2:5:1 – 5:5:1)
Black-Breasted Button-Quail	Vulnerable	Drier closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest	0.1	0.3 – 0.4 (2:5:1 – 3:5:1)
Red Goshawk	Vulnerable	Eucalypt woodland, open forest, gallery rainforest, and rainforest margins	139.4	348.5 – 487.9 (2:5:1 – 3:5:1)
Australian Painted Snipe	Vulnerable	Potentially and wetland and farm dams with suitable vegetation cover	11.2	27.9 – 39.1 (2:5:1 – 3:5:1)
Brigalow Scalyfoot	Vulnerable	Lives in brigalow/vine thicket regrowth but not tolerant of clearings	205.3	513.3 – 718.6 (2:5:1 – 3:5:1)



Species	NC Act and EPBC Act status	Habitat type	Proposed Clearing Area (ha)	Offset requirement with ratios (ha)
Collared Delma	Vulnerable	Open eucalypt and Acacia woodland with sparse understory of shrubs and tussocks or semi-evergreen vine thicket	41.6	104 – 145.6 (2:5:1 – 3:5:1)
Squatter Pigeon	Vulnerable	Grassy woodlands and open forest that are dominated by eucalypts	199.2	497.9 – 697 (2:5:1 – 3:5:1)
Ornamental Snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) woodland growing on clay and sandy soils, riverside woodland, and open forest growing on natural levees	44.0	109.9 – 153.8 (2:5:1 – 3:5:1)
Yakka Skink	Vulnerable	Open dry sclerophyll forest or woodland	119.9	299.7 – 419.6 (2:5:1 – 3:5:1)
Dunmall's Snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) forest and woodland growing on cracking black clay and clay loam soils	205.3	513.3 – 718.6 (2:5:1 – 3:5:1)
Eastern Long-eared bat	Vulnerable	River red gum forest, semi-arid woodlands and savannahs	275.4	688.6 – 964 (2:5:1 – 3:5:1)

I note that the proponent's environmental offset strategy proposes to offset direct impacts to listed species under the EPBC Act for the gas field development (refer to the above table).

I also note that the proponent's offset strategy proposes to offset direct impacts to listed ecological communities under the EPBC Act for the gas field development as follows:

Table 6.10 - EPBC ecological communities disturbed by gas field development

Species	EPBC Act status	Habitat type	Proposed clearing area (ha)	Offset requirement with ratios (ha)
Ecological community				
Brigalow ecological community	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) ecological communities	19.6	78.4 – 98 (4:1-5:1)
Semi-evergreen vine thicket	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nadewar Bioregions	0.8	3.2 - 4 (4:1-5:1)
Bluegrass ecological community	Endangered	Natural grasslands of the Queensland coastal highlands and the northern Fitzroy Basin	5.2	20.8 - 26 (4:1-5:1)
Total			25.6	102.4 - 129

I note that ratios have been included in EPBC Act offset estimates in recognition of: (a) the EPBC Act seeks offsets that are at least of equal quantity and quality; and (b) the *Draft Policy Statement: Use of environmental offsets under the Environment Protection and Biodiversity Conservation Act 1999 (Cwth)* prefers offsets to be of greater quantity and/or higher quality. **Further I note** that the proponent and Ecofund Queensland have utilised the ratios contained in the Queensland *Draft Policy for Biodiversity Offsets 2008* for determining EPBC Act offset estimates, as no specific ratios are stated in the Australian Government draft policy.

Basis of impacts as assessed by the proponent

I note that the estimates are based on direct impacts to species habitat and communities. **I note** that the EIS, SEIS and environmental offset strategy do not fully examine or nominate all areas of direct impact, and do not examine or nominate areas of indirect disturbances, including disturbances and impacts due to: edge effects; fragmentation and loss of connectivity; water treatment areas; and creation of irrigation areas. **I understand** that the proponent has argued that existing environmental offset policies at the state level only require direct impacts from clearing to be offset, and that the selection of large, strategically located offset properties will result in improved connectivity, **however I also note** that DEWHA have questioned whether the proponent is also considering indirect offsets.

Further, I note that the proponent has argued that the offset analysis for the project includes more than is required, as the GLNG project is exempt from the *Vegetation Management Act 1999* and the *Policy for Biodiversity Offsets 2008* is a draft 'under significant reform'.

Further I note that the areas nominated by the proponent to be cleared and offset are based on the proponent's 'Reasonable Worst-Case' scenario (multiple drill holes from one drill pad). **I note** that DEWHA has advised that it is more appropriate that the actual worst case 'Pre-Avoidance and Mitigation' (i.e. one well hole per drill pad) scenario is presented.

I note that the gas field vegetation clearing estimates are only based on the forecasted Field Development Plan (FDP), a sub-component within the proponent's Reasonable Foreseeable Development Area (RFDA). **Further I note** that the FDP has not been provided by the proponent as part of the EIS, hence the area of the FDP, locations of proposed wells, pipelines and associated infrastructure have not been provided, and are hence **unknown to me** at the time of writing of this report. **However, I am aware** that the EIS states the RFDA is within the Arcadia valley, Fairview and Roma gas fields and covers approximately 1.3 million ha.

I note that the FDP clearing estimates are based on the proponent's environmental constraints-based mapping and a field management protocol approach outlined in SEIS Attachment D5 – Nature Conservation (refer to Part 2 -*Environmental Constraints Mapping and Field Management Protocols*).

I also note that it is the proponent's intention that the FDP will change incrementally over the life of the project. In this regard, **I note** the methodology proposed in the environmental offset strategy. It is proposed that the proponent secure offsets at the beginning of the project, and as the gas field development progresses, and that the amount of clearing will be monitored and reported at the end of each 5 year period. **However, I consider** that it is more appropriate that the frequency of monitoring be at least annual, and that reporting requirements should match timeframes for other reporting requirements (such as annual returns and audit reports) and planning periods (submission of operational plans), keeping all documents and regulatory authorities updated regarding the status of disturbance, rehabilitation and offsets for the project.

Coordinator-General Conclusions

Following consideration of all the above, **I find** that the areas nominated by the proponent to be cleared and offset (as presented in the environmental offset strategy) represent only a small fraction of the extensive land, vegetation and watercourse disturbance likely to result from project activities in the gas fields, i.e. **I consider** that the areas proposed to be offset generally reflect direct disturbances to areas of remnant³⁷ vegetation, whereas the proposed disturbances to extensive areas of other vegetation,

³⁷ "Remnant vegetation" is defined in the *Vegetation Management Act 1999* (Qld) as vegetation, part of which forms the predominant canopy of the vegetation: covering more than 50 per cent of the undisturbed predominant canopy; averaging more than 70 per cent of the vegetation's undisturbed height; and composed of species characteristic of the vegetation's undisturbed predominant canopy.



including non-remnant (or regrowth)³⁸ vegetation and riparian areas (that individually and collectively represent an important part of Queensland’s biodiversity, ecosystem functionality as well as offering other conservation values) have not yet been considered for offset. **Therefore I will consider** in the process of reviewing operational plans whether a proportion of the extensive land, vegetation and watercourse disturbances (i.e. including riparian areas and non-remnant or regrowth vegetation) also be required to be offset, in addition to other, traditional, offset requirements outlined above.

I also find a significant majority of the GLNG gas field development will occur in areas of remnant vegetation that have a “*Not of Concern*” Regional Ecosystem biodiversity status. Although these vegetation areas are not subject to offset requirements, the proposal to deliver offsets to include strategic approach to provision of appropriate areas would consequently cover similar environmental values to those of “not of concern” ecosystems that may be disturbed. For examples, **I consider** that the proposal to acquire a large area (as much as 1500 hectares) of Brigalow belt bioregion in one or two large parcels and up to 250 hectares of priority coastal land which is part of the southeast Queensland bioregion is a suitable initial offset package which **I believe** will achieve the requirements of government policies, and also deliver benefits to the conservation estate in Queensland.

For offset conditions for the gas field, refer to Condition 5, Appendix 2, Part 2 in this report.

Offsets package

In order to monitor this offsets package the abovementioned condition requires a reporting program **I have included** in the condition a suggested acceptable solution which should be followed by the proponent in satisfaction of the relevant requirements of the offsets condition. This will recommend that each operational plan will provide actual disturbances planned, and a third party audited reconciliation of disturbance and rehabilitation on the first annual anniversary and at the end of the operational plan. This will be compared with the environmental offsets that are in place together with a plan for updating the offsets.

I reserve the right to require further environmental offsets be supplied by the proponent (environmental authority holder) for the GLNG project following the regulator’s evaluation of actual (third-party audit reconciled) vegetation disturbance and rehabilitation information for the project and/or upon receipt and acceptance of, or prior to commencement of, a new operational plan.

Gas transmission pipeline

I note that the environmental offsets strategy has determined that a total of 103.7 ha of regional ecosystems and essential habitat under the *Vegetation Management Act 1999* require offsetting for the gas transmission pipeline option³⁹. **I note** this is based on a 30 m right of way (ROW). In addition within the State Development Area, a total of 18.68 ha of regional ecosystems have been determined as requiring offset under the *Vegetation Management Act 1999*.⁴⁰

The following tables represent the area of clearing of the gas transmission pipeline.

Table 6.11 - Ecosystem and Habitat disturbances for gas pipeline

Ecosystems ⁴¹			
Regional ecosystem	Description	VM Act Status	Proposed clearing Area (ha)
11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	1.2

³⁸ Vegetation is termed “non-remnant” or “regrowth” until it reaches the threshold to be classified as “remnant vegetation” as defined in the *Vegetation Management Act 1999* (Qld).

³⁹ Also refer to SEIS, Part 2, E3 Nature Conservation, Table 3.6.

⁴⁰ Also refer to SEIS, Part 3, E3 Nature Conservation, Table 5.2.

⁴¹ Refer to SEIS, Part 2, E3 Nature Conservation, Table 3.6.

11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	1.2
11.9.4	Semi-evergreen vine thicket on fine grained sedimentary rocks	Endangered	2.1
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	Endangered	3.5
12.3.3	<i>Eucalyptus tereticornis</i> woodland to open forest on alluvial plains	Endangered	0.7
11.3.2	<i>Eucalypt populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of Concern	4.5
11.3.3	<i>Eucalyptus coolabah</i> woodland on alluvial plains	Of Concern	2.8
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus spp.</i> tall woodland on alluvial plains	Of Concern	1.99
11.3.17	<i>Eucalypt populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of Concern	4.2
12.11.14	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> woodland on metamorphics ± interbedded volcanics	Of Concern	4.7
11.10.8	Semi-evergreen vine thicket in sheltered habitats on medium to coarse grained sedimentary rocks	Of Concern	0.31
11.12.3	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> , <i>Angophora leiocarpa</i> woodland on igneous rocks especially granite	Least Concern Associated with a watercourse	2.13
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least Concern Associated with a watercourse	15.97
Sub-total			44.1
Essential habitat for species			
Regional ecosystem	Description	Species	Proposed clearing area (ha)
12.3.3 / 12.3.7 / 12.3.11	<i>Eucalyptus tereticornis</i> woodland to open forest on alluvial plains	Koala (<i>Phascolarctos cinereus</i>) (SEQ bioregion)	4



11.10.1	Corymbia citriodora predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30 m high)	<i>Apatophyllum teretifolium</i>	1.0
11.10.1	Corymbia citriodora predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30 m high)	<i>Acacia pubicosta</i>	3.2
11.10.13	Open-forest (to woodland) with a range of canopy species	<i>Acacia gittinsii</i>	12.7
11.3.26 / 11.10.13 / 11.10.4	<i>Eucalyptus moluccana</i> or <i>E. macrocarpa</i> or <i>E. pilligaensis</i> ± <i>E. populnea</i> ± <i>E. melanophloia</i> tall open-forest to woodland ± <i>Allocasuarina luehmannii</i> low tree	<i>Acacia pedleyi</i>	10.9
11.11.15 / 11.11.4	<i>Eucalyptus crebra</i> ± <i>Corymbia erythrophloia</i> ± <i>E. populnea</i> ± <i>E. melanophloia</i> tall open-forest to woodland often with a shrubby layer	<i>Cycas megacarpa</i>	27.8
Sub-total			59.6
State Development Area⁴²			
Regional ecosystem	Description	VM Act Status	Proposed clearing area (ha)
11.1.1	Sporobolus virginicus grassland on marine clay plains	Least Concern Associated with a wetland	1.43
11.1.2	Samphire forbland on marine clay plains	Least Concern Associated with a wetland	8.89
11.1.4	Mangrove forest/woodland on marine clay plains	Least Concern Associated with a wetland	0.7
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldule</i> woodland fringing drainage lines	Least Concern Associated with a watercourse	1.43
11.3.25b	Riverine wetland or fringing riverine wetland. <i>Melaleuca dendra</i> and/or <i>M. fluviatilis</i> , <i>Nauclea orientalis</i> open forest	Least Concern Associated with a watercourse	1.34

⁴² Refer to SEIS, Part 3, E3 Nature Conservation, Table 5.2.

12.3.6	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> woodland on coastal alluvial plains	Least Concern Associated with a watercourse	4.89
Sub total			18.68
TOTAL			122.4

In addition, I note that the environmental offsets strategy has determined that 11.02 ha of fish habitat types under the *Fisheries Act 1994* require offsetting for the gas transmission pipeline, as follows:

Table 6.12 - Fish habitat disturbance from gas pipeline

Habitat type	Proposed disturbance area (ha)
Sporobolus virginicus grassland on marine clay plains	1.43
Samphire forbland on marine clay plains	8.89
Mangrove forest/woodland on marine clay plains	0.7
TOTAL	11.02

In addition for protected plants under the *Nature Conservation Act 1992*, I note a total of 55.6 ha of protected plant habitat is proposed to be cleared.

This yields a total offset requirement of 166.8 – 222.4 ha for the gas transmission pipeline. However, I note that as species occur in similar habitats, offsets are proposed to be co-located. The analysis includes protected plants identified in field surveys and those that have been mapped within 'essential habitat' under the *Vegetation Management Act 1999*.

Regarding threatened fauna species under the *Nature Conservation Act 1992*, I note that a total of 9.6 ha of threatened fauna species habitat is proposed to be cleared, and a total offset requirement of 24 – 33.6 ha has been determined for the gas transmission pipeline.

EPBC Act offset requirements

I note that the proponent's environmental offset strategy proposes to offset direct impacts to listed species and ecological communities under the EPBC Act for the gas transmission pipeline, as follows:

Table 6.13 - EPBC Act species and communities disturbance and offset requirements

Listed species or ecological community	EPBC Act status	Habitat type	Proposed clearing area (ha)	Offset requirements (with ratio)
Species				
Squatter Pigeon	Vulnerable	Grassy woodlands and open forests that are dominated by eucalypts	5.6	14 - 19.6 (2.5:1 – 3.5:1)



Cycas	Endangered	Woodland, open woodland and open forests, with a grassy understory	27.8 (Individual plants = 665 + 1,085)	111.2 - 139 (4:1-5:1)
Sub total			33.4	125.2 – 158.6
Ecological community				
Brigalow ecological community	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) ecological communities	4.7	18.8-23.5 (4:1-5:1)
Weeping myall woodland	Endangered	<i>Eucalyptus populnea</i> woodland on alluvial plains	4.5	18 - 22.5 (4:1-5:1)
Semi-evergreen vine thicket	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nadewar Bioregions	2.41	9.6 - 12 (4:1-5:1)
Sub total			11.61	46.4 - 58
Total			45.01	171.6 – 216.6

For offset conditions for the gas transmission pipeline, refer to Condition 6, Appendix 3, Part 3 in this Report.

LNG facility

I **note** that the environmental offsets strategy has determined that 134.5 ha of regional ecosystems and essential habitat under the *Vegetation Management Act 1999* require offsetting for the LNG facility. The regional ecosystems are either 'endangered', 'of concern' or associated with wetlands/watercourses.

Regarding biodiversity offsets for the LNG facility, requirements are based on the clearing of regional ecosystems that support habitat for threatened flora and fauna species under the *Nature Conservation Act 1992*. I **note** that as species occur in similar habitats, offsets are proposed to be co-located, and thus offset requirements are not presented as a cumulative total, rather per species habitat area, as follows:

Species	NC Act status	Habitat type	Proposed Clearing Area (ha)	Offset requirement with ratios (ha)
Koala	Vulnerable (SEQ Bioregion)	Eucalyptus tereticornis woodland to open forest on alluvial plains	34.1	85.25 – 119.35 (2:5:1 – 3:5:1)
Beach Stone Curlew	Vulnerable	Open, undisturbed beaches, islands reefs, and estuarine intertidal sand and mudflats, preferring beaches with estuaries or mangroves nearby	26.7 Mangroves and saltmarsh	66.75 – 93.45 (2:5:1 – 3:5:1)

Scooty Oystercatcher	Rare	Rocky headlands, rocky shelves, exposed reefs with rocky pools, beaches and muddy estuaries	26.7 Mangroves and saltmarsh	53.4 – 80.1 (2:1 – 3:1)
Powerful Owl	Vulnerable	Open forest and woodlands, as well as along sheltered gullies in wet forests with dense understoreys, especially along watercourses. Sometimes found in open areas near forests.	66.9 RE 12.3.3 + 12.11.14	167.25 - 234.15 (2:5:1 – 3:5:1)
Glossy Black Cockatoo	Vulnerable	Coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks). Its main food trees are common.	66.9 RE 12.3.3 + 12.11.14	167.25 - 234.15 (2:5:1 – 3:5:1)

I note that no environmental offsets are proposed in relation to EPBC Act matters for the LNG facility or marine facilities, as the SEIS concludes that there will be no significant impacts to listed ecological communities and species habitat resulting from LNG facility activities. Refer to section 4.1 in the proponent's environmental offset strategy.

In addition, **I note** that the environmental offsets strategy has determined that 33.5 ha of fish habitat under the *Fisheries Act* 1994 require offsetting for the LNG facility, however, **I note** that the proponent's environmental offset strategy states that direct impacts as a result of dredging activities in Port Curtis have not been included in this determination.

For offset conditions for the LNG facility, refer to Condition 4, Appendix 4, Part 3, in this Coordinator-General report.

Offset requirements for additional dredging

It is assumed that the major channel dredging works required for the project are to be undertaken as part of the Western Basin Dredging project (WBD). The remaining components of the project affecting the marine environment are summarised as follows:

- permanent removal of marine plants within the footprint of the LNG plant and terminal
- dredging for the access channel to the materials offloading facility
- installation of the gas pipeline across the Narrows

Impacts associated with these components would contribute, in a relatively minor sense, to the cumulative effects on the marine environment of Port Curtis when considering all the proposed dredging and construction works. The most extensive of these include Western Basin Dredging (WBD), Fishermans Landing Port Expansion (FLPE) and Wiggins Island Coal Terminal (WICT) projects. These projects when approved will have their own offsets package.

EIS states that approximately 8 million m³ of material will require dredging for the access channel and swing basin to enable barge and ferry access to the MOF. Information supplied in the EIS for the project indicates that construction of the marine facilities, including dredging for the MOF, would be undertaken in the initial stage of the project (2010/11). Accordingly this is unlikely to coincide with the peak dredging effort for WBD and FLPE which is scheduled over the period 2011-14.



The indicative impacts of a CSD dredging has been modelled in the EIS although the tailings water discharge from a disposal facility has not been included. In addition, the simulation of the CSD in the model is located within the swing basin - some distance from the MOF dredging area. The model results show that a turbid plume would extend several kilometres from the works in accordance with the predominant tidal flows. The major effects (where elevated levels of suspended sediments exceed 25 mg/l) would be limited to an area approximately 250m either side of the dredge. Based on these simulations it can be inferred that the works would have potential for temporary impact on the shoreline of China Bay and the 34 ha of seagrass in the vicinity of South Passage Island. This area is also likely to be subsequently affected by the WBD works (in particular the dredging of the swing basin for the project) although the WBD project would have a greater spatial and temporal extent.

The EIS includes an indicative impact assessment for the installation of the pipeline crossing of The Narrows. The modelling shows that plumes of elevated turbidity would extend into The Narrows past the northern tip of Kangaroo Island and also eastward into Graham Creek. The EIS indicates that low generation rates expected to be caused by the backhoe operations would result in only relatively low levels of elevated suspended sediment, less than 5 mg/l away from the works. Further information provided by a technical working group suggests that actual generation rates may be higher. Depending on the timing of the proposed works and the construction techniques employed, it can be expected that moderate adverse effects to the intertidal wetlands of Kangaroo Is and Graham Creek could occur. These areas are also likely to be affected by the WBD and FLPE works. Indicative construction schedules suggest the potential for co-incident timing of the pipeline crossing works with dredging/rehandling operations for the WBD project.

DERM has advised that insufficient information has been provided to accurately assess the impacts of the proposed pipeline crossing and the construction of marine facilities. In sections 8.4 and 9.1.3 of this report **I have required** that that proponent undertake further impact assessment of these matters prior to seeking approval of development permits for the works. Although further detail would be needed for statutory approvals, a conservative upper limit to the potential effects has been estimated to enable an appropriate offset to be determined for the cumulative impacts.

A strategic offset proposal has been prepared by GPC to mitigate the residual impacts of the WBD, FLPE and WICT. **I am currently considering** this proposal as part of my assessment of the WBD and FLPE projects which, due to their combined nature and scale, are likely to cause the majority of the overall impacts on water quality in Port Curtis. Given the cumulative nature of these temporary impacts caused by these various activities, all relevant projects are to be considered together taking into account the additive effects both spatially and temporally. **Accordingly, I have extended** the scope of the strategic offset package to include the temporary impacts of the proposed construction of marine facilities on Curtis Island and the installation of a bundled pipeline crossing of The Narrows. This will be finalised in my evaluation of the WBD project.

At minimum this strategic offset package will include:

- the protection in perpetuity of an area of 5000 ha of coastal land at Port Alma currently within GPC's Strategic Port Land (SPL)
- contribution of \$5 million to DEEDI (Fisheries Queensland) to support future research or studies which have practical and tangible outcomes for fisheries habitat and productivity within the region
- the permanent loss of marine plants within the project footprint are a distinctly separate impact and are not considered in the strategic offset package.

Offset property selection

I require that environmental offsets are to be secured by the proponent, in a manner that achieves a "no net loss" of biodiversity outcome, and in a manner and timeframe acceptable to DERM. **I require** that an environmental offsets program, consistent with the Queensland Government Environmental Offsets Policy 2008 (QGEOP) must be provided for approval prior to the issue of environmental authorities. Offsets proposals will be required for the gas fields under Condition 5 Appendix 2 Part 2, for the gas pipeline Condition 6, Appendix 3 Part 3, for the LNG facility Condition 4, Appendix 4, Part 3.

In order to limit the disturbances of sensitive ecosystems, species and habitat, **I require** that it be limited to the disturbances of each item of the tables as listed in the proponent's Supplementary EIS, and presented in section 6.5 of this report. Accordingly, such a limit is required to be presented in the proponent's environmental offset program. This is to be submitted to me prior to environmental authorities being issued. This provision is contained in the above three conditions.

The proponent has offered, through Ecofund Queensland, offset packages in accordance with Queensland and Australian Government policies using both 'traditional', being smaller scattered areas offsetting individual values on a case by case basis and a 'strategic approach', being larger, self-sustaining tracts.

The 'strategic' approach to offset identification enables selection of land that can be secured and managed to improve connectivity in the landscape, reduce edge effects and provide significant conservation outcomes for threatened vegetation communities and species. The strategic approach may present opportunities for land to be acquired and transferred to the Queensland Government as a protected area.

Regarding property selection, **I recommend** that the 'strategic' approach outlined in the environmental offset strategy be pursued in preference to the 'traditional' approach. **That is, I require** the securing of larger, more viable and strategically located areas which deliver significant conservation outcomes (high biodiversity values) while contributing to the long-term expansion of projected areas (and possibly National Park) in Queensland.

I note that the proponent has recently submitted⁴³ an offset proposal titled *GLNG Environmental Offsets Proposal Summary Report, April 2010*. **I note** that the proposal contains a brief outline of the offset package, nominating up to five (5) properties to directly offset potential impacts to listed species and World Heritage values. The proponent has advised that key ecological communities such as Brigalow, Weeping Myall Woodlands and Natural Grasslands will be offset by the offset package. The proposal describes offset property values, as assessed by the proponent, and describes the proposed steps to evaluate and secure the proposed offset properties.

Coordinator-General's conclusion

The proponent states that their environmental offset package meets the objectives of both Queensland and Australian Government offset policies, and in most cases the proposed offset areas are many times greater than the original impact areas. **However, I note** that the offset proposal has not been assessed nor evaluated as part of this Coordinator-General report. **I require** a condition in Appendix 2, Part 2, Condition 5, Appendix 3, Part 3, Condition 6, and Appendix 4, Part 3, Condition 4, that an environmental offsets program be prepared and assessed under State and Australian Government approvals.

⁴³ Via email from proponent, received 4 May 2010.



7 Gas fields

7.1 Gas field activities

The Santos Gas Fields (Roma, Arcadia and Fairview), located within the Surat and Bowen Basins, are proposed to be developed over a period of approximately 25 years to provide coal seam gas (also known as coal bed methane) to the proposed Gladstone Liquefied Natural Gas (GLNG) Facility on Curtis Island, near Gladstone in Central Queensland.

Gas field activities will involve construction and operation of gas fields, based on a production of approximately 5,300 petajoules (PJ) (140 billion m³) sufficient to provide gas for the first LNG production train, from the gas field. Gas Field activities will involve development of approximately 2,650 exploration and production wells. It is anticipated that about 1,200 wells will be established prior to 2015, with potential for 1,450 or more additional wells after 2015. Stage 1 Gas Field activities also include, installation of other operationally related infrastructure including access roads and tracks, in-field gas gathering networks (to transport gas from the wells to field compression stations), associated water management facilities (including brine ponds and water gathering networks), accommodation camps, offices and workshops.

7.1.1 Land disturbance and vegetation clearing

The EIS describes GLNG Gas Field tenements (for Stage 1) which cover an area of approximately 2.4 million hectares (ha) of which a Reasonably Foreseeable Development (RFD) area component is expected to encompass about 28 per cent of the tenements, or 690,000 ha. At this stage, the proponent is seeking approval for Stage 1 of the CSG Field development, which it says is sufficient to supply gas to one train of the LNG plant, and is not seeking, as part of this EIS process, approvals for the additional CSG Field development and associated tenures which may be required for Stages 2 and 3 of the LNG Facility (trains 2 and 3). Such future gas fields will require their own approvals process including an EIS.

The proponent estimates that 2,500 ha of land and vegetation will be disturbed for development of the proposed 2,650 CSG wells during Stage 1 of the GLNG project. Individual operational wells typically account for no more than one hectare of disturbance.

In addition to CSG wells, installation of other operationally related infrastructure will be required, including access roads and tracks, accommodation camps, water gathering networks, water management facilities, in-field gas gathering networks (to transport gas from wells to field compressor stations), infield gas compressor stations and pipeline compressor stations.

The EIS states that approximately 6,500 km of road and access tracks will be constructed for GLNG Stage 1. The EIS does not clearly indicate the exact area occupied by tracks and pipelines, so **I am making an estimate**. If the average width of roads and tracks is conservatively assumed to be approximately 6 m (including easements), then **I find** that the expected land and vegetation disturbance due to road and track construction for Stage 1 could be 3,900 ha.

Hence total footprint of developments could amount to the sum of well site and roads and tracks disturbance areas, or 6400 hectares.

7.1.2 Impacts on ecological values

The Gas Field development will, however, result in disturbance to a number of ecological communities that have been identified under either Queensland or Australian Government legislation as being of environmental value.

The Australian Government *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) provides for the listing of nationally threatened native species and ecological communities, native

migratory species and marine species, categorised as either "*Vulnerable*", "*Endangered*" or "*Critically Endangered*". The proponent has identified potential presence of four "*Endangered*" ecological communities (present in both the northern and southern GLNG Gas Fields), and one "*Critically Endangered*" ecological community (present within the southern GLNG Gas Fields), as summarised in the table below.

The Queensland Government provides a biodiversity status for remnant vegetation communities on a bioregion basis. The biodiversity status of Regional Ecosystems (REs) are categorised as either "*Endangered*" (i.e. of high nature conservation value), "*Of Concern*" or "*Not of Concern*", and are identified in a database maintained by the administering authority. The Queensland *Environmental Protection Regulation 2008* provides for levels of protection for Environmentally Sensitive Areas (ESAs), categorised as Category A, B or C ESAs.

National Parks and protected conservation areas are Category A ESAs. "*Endangered*" REs and "*Of Concern*" REs are classified as Category B and C ESAs respectively. In Queensland, petroleum activities may not be undertaken in Category A ESAs, however may be undertaken in Category B and C ESAs.

Ecological communities of environmental value for Stage 1 of the GLNG Gas Field development have been summarised (both EPBC Act listed threatened communities and their equivalent REs) as follows:

Table 7.1 - Comparison of ecological communities – EPBC and Queensland

Australian Government - EPBC Act Listed "<i>Endangered</i>" ecological communities	Equivalent Queensland – Regional Ecosystems within the Brigalow Belt Bioregion
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	RE 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 1.9.5, 11.9.6, 11.11.14, and 11.12.21.
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (includes Bluegrass species)	RE 11.3.21, 11.4.4, 11.8.11, 11.9.3, 11.9.12, and 11.11.17
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	RE 11.2.3, 11.3.11, 11.4.1, 11.5.15, 11.8.3, 11.8.6, 11.8.13, 11.9.4, 11.9.8, and 11.11.18
The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin	RE 11.3.22 (Springs associated with recent alluvia) ⁴⁴
Australian Government - EPBC Act Listed "<i>Critically Endangered</i>" ecological communities	Equivalent Queensland – Regional Ecosystems within the Brigalow Belt Bioregion
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	In Queensland this ecological community is a primary component of the following REs within the Brigalow Belt Bioregion: 11.8.2a, 11.8.8, 11.9.9, 11.3.23

The EIS does not appear to indicate the number of hectares against each of the ecosystem classes.

⁴⁴ Note: this is not part of the EPBC Act listed ecological community.



7.1.3 Quantifying impacts on ecological values

According to the proponent, all of the Queensland CSG projects are located in the Brigalow Belt Bioregion, and it claims the majority of the development required for the GLNG project will either occur in previously cleared areas, or in areas of remnant vegetation that have a “*Not of Concern*” Regional Ecosystem biodiversity status. That is, most of the disturbance is not in the above tabled endangered ecological communities.

However, detailed mapping for each of the threatened communities was not presented in the EIS or SEIS. Likewise, site-based information regarding project operations (including location of activities) and overlap with each of the threatened communities has not been presented in the EIS or SEIS.

The proponent has presented a short report in the SEIS which describes a desktop analysis of three scenarios of development, from worst case (“pre-avoidance and mitigation”), to most likely (“reasonable worst case”) to best case (“Reasonable best case”). This spans a ratio of disturbance estimated at 13.5 to 4 to 1 for the three cases respectively. This means that the worst case could disturb 13.5 times the vegetation as the best case, and the most likely case 4 times as much as the best case. The analysis centred on the most likely case as the base case for decision making, in particular the requirement for offsets areas.

In the worst-case scenario (i.e. individual well drill pads), the GLNG EIS estimates that the project could potentially disturb the following areas of EPBC Act “Endangered” ecological communities: Brigalow (52 ha), Semi-evergreen vine thicket (69 ha), and Bluegrass (8 ha), hence totaling about 129 hectares. However, the proponent has concluded that the more likely scenario is that of the reasonable worst case, where most of the wells will be drilled from multiple well drill pads (up to 5 wells drilled from a single pad. For this case it is claimed a much smaller area (possibly only 26 ha) of these endangered communities will be affected.

By comparison the affected areas of State Regional Ecosystems were estimated at 298 hectares for the worst case, 143 hectares for the most likely, and 123 hectares for the best case.

These are only the impacts on endangered and of concern ecosystems from direct clearing of vegetation expected. No disturbance estimates have been provided for impacts on the large areas of remnant vegetation, that have a “*Not of Concern*” Regional Ecosystem biodiversity status.

Furthermore, the EIS and SEIS did not present evidence which established that details of these estimates have been validated by field work undertaken to check the mapping and the proposed field development plan.

The estimates also need to be seen in comparison to the possible 6400 hectare footprint that wells, roads and pipelines have on the landscape. The EIS and SEIS do not present maps showing facilities and ecosystems overlaid together

7.1.4 Minimising impacts on ecological values

The key strategies presented by the proponent as to how it might determine and map the field development is by processes named ecological constraints mapping and field management protocols.

Ecological constraints mapping is a geographical assembly of layers of maps each identifying a different environmental value, for example endangered regional ecosystems, representing an ecological constraint to development. By examining the overlapping constraints mapping it can assist in determining the least disturbance location for field gas wells and other infrastructure.

Field management protocols specify how to avoid ecological and other constraints, survey prior to construction, and revise the draft field plan when managing the planning and implementation of field development. The proponent has identified a range of ecological constraints classes (Class A to E), and intends to implement field management protocols (as specified for each constraints class) to reduce the impact of project activities on ecological values.

DERM has advised that the material presented in the EIS and SEIS on constraints based management does not provide sufficient safeguards or include the full scope of DERM environmentally sensitive areas, and is seeking a condition that obliges the proponent to provide this material prior to lodgement of an application for a gas fields environmental authority. Also DERM seeks more detail on the potential impacts to sensitive areas, and is seeking a recalculation of the areas of disturbance which were presented in the SEIS documentation, to make the calculation more transparent. This is particularly so for the calculations which surround the estimation of required offsets.

Section 310D of the *Environmental Protection Act 1994* requires proponents to prepare an EM Plan for submission with an application for environmental authority which addresses:

- a detailed description of the project
- the environmental protection commitments under best practice environmental management
- contain enough other information to decide on conditions to be imposed by the environmental authority
- include a rehabilitation program for land disturbed.

DERM advises that, although the proponent has provided general mitigation measures, they are not based on detailed project descriptions, do not have details of construction methodology, and do not include locations for infrastructure, so therefore cannot be used by DERM to construct appropriate approval conditions at this time.

Coordinator-General's conclusion

I have not been presented with sufficient information on the impacts and operations of any part of the Gas Field beyond information pertaining to the gas supply for the first train of the LNG Facility. Therefore **I confine my evaluation report** to conditions which attach to the gas field which produces up to 5300 PJ of coal seam gas over the period of its life, sufficient to provide gas for the first LNG train.

Taking into account the lack of suitable presentation of field development plans, **I cannot be certain** of the extent of disturbance which the project will have on each class of biodiversity status.

In addition, **I have not been presented** with sufficient information on proposed activity locations, and associated ecological impacts, to enable determination of specific impacts on environmental values, and **I therefore have developed** a set of conditions which can lead to the approval for a gas field development as the conditions are fulfilled.

To this end **I have been advised** by DERM on the information specified by the EP Act that would still be required before approvals could be issued under environmental legislation. Their advice and recommendations are discussed in the next section.



7.2 Gas field development reports

As discussed in previous sections, **I am not convinced** that there is sufficient detail in the draft EIS and SEIS on the design construction layout and location of the gas field infrastructure, in order to determine with some degree of accuracy the impacts on environmental values in the gas fields. The content of the EIS and SEIS is furthermore not sufficient to provide the necessary detail required by the legislation in applications for environmental authorities for petroleum and gas tenures.

Addressing the field development program that is intended for the gas fields is a major activity since it is clear from the SEIS that activity to date is mainly desktop research and reported on in the SEIS Attachment D5. Despite the constraints mapping which has been presented, there is no field development plan showing positions of the infrastructure, and the details of the disturbance which may be occasioned on regional ecosystems.

Further assessment of the additional material that DERM requires, indicates to me that a series of reports must be prepared as assessment material, to me and to DERM during the course of the process for obtaining and implementing the environmental authority for the gas fields.

The matters on which **I shall require** reports are the following:

1. With the application for environmental authority
 - Gas field cumulative impacts assessment report
 - Ecological constraints Planning
 - Coal seam gas water management plan
 - Brine Management Plan
 - Environmental Offsets program
2. Prior to commencement of petroleum gas field activities
 - Water quality monitoring program
 - Regional groundwater model
 - Groundwater and springs impact assessment
 - Operational plans
 - Water quality and soil monitoring plan

7.2.2 Reports required with the environmental authority application

Ecological constraints planning strategy

DERM has advised that the material presented in the EIS and SEIS on constraints based management does not provide sufficient safeguards or include the full scope of DERM environmentally sensitive areas, DERM is therefore seeking a condition to provide this material prior to the issue of gas fields environmental authorities. This condition is incorporated in Appendix 2 Part 2 Condition 1.

Gas field cumulative impacts assessment material

DERM recognises that the government is putting in place strategies to identify certain aspects of multiple project cumulative impacts for social and economic issues in the Surat Basin and to cover monitoring of groundwater. However potential cumulative impacts from broad scale gas field developments may be evident when two or more projects interact.

Hence **I apply** condition 2 Appendix 2 Part 2 to highlight any cumulative impacts from adjacent fields which may arise on the following nature conservation matters

- Regional impacts on terrestrial flora and fauna, biodiversity values, listed species and ecosystems
- Riparian habitats
- Surface and groundwater environmental values
- Soils, including ability to support ongoing agricultural production.

Coal Seam Gas Water Management Plan

This is discussed in section 7.6

This refers to Condition 3 in Appendix 2 Part 2

Brine Management Strategy

This is discussed in section 7.6

This refers to condition 4 in Appendix 2 Part 2

Environmental Offsets

This is discussed in section 6.5

This refers to Condition 5 in Appendix 2 Part 2

I require the above four reports to be submitted to me, and to DERM for review and advice, at the earliest opportunity, since this will guide me in my assessment that the gas field development is in accordance with government policy for CSG development, and will also provide DERM with necessary project environmental strategies to enable it to make the assessment of any applications for environmental authorities.

7.2.3 Reports required prior to commencement of CSG activities

Operational Plans

Once an environmental authority is granted, the proponent will be expected to develop its operational plans for the various gas fields which will nominate disturbance areas for the range of infrastructure, such as gas wells, field compressor stations and water treatment facilities, for the extent of field development which the plan is seeking to cover.

Hence I set condition 6, in Appendix 2 Part 2 to require that operational plans are prepared and submitted prior to petroleum activities being undertaken in the fields.

Regional groundwater model

A major issue of concern for communities and DERM is the fate of the groundwater supply and quality in other aquifers, after the extraction of gas, and associated water. In particular, DERM advise that the current model does not appear to include the Gubberamunda or Springbok formations and the potential linkage with springs. All major coal seam gas operators will be required to develop an appropriate groundwater model to allow assessment of whether there are effects on other aquifers.

I require that condition 7 Appendix 2, Part 2 be applied to ensure provision of an appropriate model to assist in assessing groundwater impacts:

Groundwater and springs

I require the proponent to prepare a groundwater impact assessment report prior to activities to be carried out under the environmental authority. This is presented as Condition 7 in Appendix 2 Part 2.

Water quality and soil monitoring program

DERM has assessed material in the EIS and SEIS on soil environmental values, surface water quality, and impacts in streams and aquatic ecosystems. It has been found inadequate in some respects to begin the baseline monitoring which is necessary to commence a major long term regionally based land and water project. In addition it must reflect parameters and indicators relevant to the proposed water management and disposal strategies. As a result I nominate that condition 9 in Appendix 2 Part 2 is required to overview the proponent's plan.



7.3 Environmental Management Plans

DERM advises that the EM Plans necessary for full support of an application for environmental authority must follow the provisions of section 310D of the EP Act.

Section 310D of the EP Act requires proponents to prepare an EM Plan for submission with an application for environmental authority which addresses:

- a detailed description of the project
- the environmental protection commitments under best practice environmental management
- contain enough other information to decide on conditions to be imposed by the environmental authority
- include a rehabilitation program for land disturbed.

A guide to describe fully the intention and satisfactory elaboration of these statutory requirements is contained in the DERM guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities (DERM 31 March 2010)*. This should be used to guide the preparation of submission materials for gas field development plans that I **require to be presented to me** in order that I **can judge** the acceptability of the field development opportunity.

Hence once the above reports are submitted to me and approved, for the gas field development within the area for which the petroleum lease is being sought, the following process should be followed for submission of EM Plans.

Environmental Plan for gas fields development

1. The EM plan must be prepared in accordance with the latest DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
2. Any comments made by the Coordinator-General and DERM should be incorporated into a revised EM Plan that will need to accompany Environmental Authority applications.
3. The EM Plan must specifically include, but not be limited to, the petroleum activities set out in the approved Work Program and/or Development Plan for the relevant petroleum authority as required under the *Petroleum Act 1923* or the *Petroleum and Gas (Production and Safety) Act 2004*.

7.4 General conditions for gas fields

DERM has advised further information requirements that should be provided to DERM in order to provide sufficient material as a result of implementing environmental authorities for the gas fields. I **provide** these further **specifications here and require** the following general conditions for gas fields: These condition is presented in Appendix 2 Part 2, Conditions 10 to 15.

Hydraulic fracturing

The EM Plans, developed in accordance with Section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields, must contain an assessment of the impacts from hydraulic fracturing and proposed mitigation measures to protect the groundwater environmental values. This condition is provided in Appendix 2, Part 2, Condition 10.

Soils information

Operational plans developed to support the applications for petroleum leases for the gas fields must be accompanied with soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. This is to be provided in Appendix 2 Part 2 Condition 11.

Construction Management Plan

The proponent must provide to DERM for review, prior to commencement of construction, a construction management plan for petroleum tenure for the gas fields that includes a construction schedule and methodology including plans and maps showing the location of facilities and discharge points and emission controls for compressor plants, water treatment, sewage treatment and other petroleum activities proposed to be undertaken on the petroleum lease;

This is presented as condition 12 in Appendix 2 Part 2

Nature Conservation Act

These requirements apply to clearing of plants protected under the *Nature Conservation Act 1992*. This is presented as condition 13 Appendix 2 Part 2.

Vegetation and Pipelines

A condition is required to deal with the disturbance to fauna habitat when clearing for field pipelines. This is presented as Condition 14 Appendix 2 Part 2.

7.5 Model conditions

DERM, in consultation with the Australian Petroleum Production and Exploration Association (APPEA), has developed 'Model Conditions' that could guide environmental authority applicants for coal seam gas fields. Previous sections of this report have discussed the nature of information that is needed to satisfy both DERM and myself of the proposed gas field development arrangements.

I outline here how the model conditions are integrated into the approval process for CSG gas fields to account for the information flow requirements for progressive field development.

Queensland state regime for conditioning coal seam gas (CSG) gas field projects

CSG gas field development is an activity which taps into an underground coal resource over a wide area, but the surface footprints are discrete 'islands' of disturbance while connected by tracks and buried pipelines. However the position and number of these 'islands' is governed by the ongoing productivity of the resource, which is not known until the field is being developed and wells start to produce. Hence proponents will develop fields progressively in accordance with ground truthing of the constraints and resources.

In order to provide greater certainty for conditioning, in the Coordinator-General's EIS process, **I am requiring** that strategic information and reports on certain aspects of the project will be provided to the Coordinator-General and DERM prior to and with the application for environmental authorities for the gas fields. This will be followed after permitting by more information provided to regulatory authorities to validate field development strategies.

DERM has produced a set of three guidelines for the environmental management of CSG gas fields and use of CSG water. These are:

- *Preparing an environmental management plan for coal seam gas activities* (DERM, 31 March 2010)
- *Model conditions for coal seam gas activities* (DERM, 31 March 2010)
- *Approval of coal seam gas water for beneficial use* (DERM, 31 March 2010)

These are accessible from the Queensland Department of Environment and Resource Management [website](#).



In addition to this further strategic policies are being developed by the government to deal with monitoring of groundwater resources, and cumulative impacts on groundwater.

A fact sheet—[New Arrangements to Protect Groundwater Resources in Coal Seam Gas Extraction Areas](#) provides an outline of the statutory framework being developed to ensure CSG producers manage the impacts of water extraction.

Environmental authority conditioning

As an outcome of the Coordinator-General's report for CSG projects, the following three phase process to permitting has been developed, where field development information is not available in advance:

Phase A: Prior to environmental authority approval, **I will** receive reports and strategies to ensure that objectives for field development accord with CSG policy;

- cumulative impacts report
- ecological constraints mapping (in terms of both NES and state values), including revision of field development protocols
- offsets strategies
- CSG water management plan
- brine management strategy

After receipt of this information, DERM will develop activity and site specific conditions based on the Model Conditions that would allow GLNG to conduct petroleum activities in a way that would protect or enhance environmental values. Before any conditions can be recommended for an Environmental Authority an EM Plan that meets the requirements of section 310D of the *Environmental Protection Act 1994* as set out in the guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities* will need to be provided. This requirement is discussed in the previous section of this report. However, the Model Conditions should provide an indication of the environmental standards required for gas field petroleum activities

Phase B: Reports and plans on field development to be delivered after permitting but prior to commencement of gas field activities:

- water quality monitoring program
- operational plan and specifications of facilities
- regional groundwater model
- groundwater and springs impact assessment
- water and soils monitoring plan

Model conditions

The model conditions provides a suite of suitable conditions for CSG specific activities that can be used as a consistent starting point for the conditioning of environmental authorities for CSG gas field activities.

The contents of model conditions contain provisions to manage gas field activities for the following subjects:

- the overall number and footprint size of authorised petroleum activities (those activities permitted by the *Petroleum and Gas (Production and Safety) Act*, and listed in Schedule A of the model conditions
- preparation of an Operational Plan
- third party audit
- ecological assessment of land, and rules for location of “limited petroleum activities” and allowable disturbance in sensitive areas. (“limited petroleum activities” encompasses wells, tracks and flowlines, but not processing infrastructure such as compressors, water plants, dams and accommodation sites)

- requirements to prepare and implement management procedures for erosion, soils, fauna, pests, chemicals and fuels, and rehabilitation
- monitoring programs and limits are specified for groundwater, noise and air emissions
- a Coal Seam Gas Water Management plan must be presented which allows management only by certain methods and criteria that are contained in the beneficial use guideline
- salt and brine management is currently only permitted by encapsulation or processing of salts into other products. Brine injection conditions are expected to be developed in the future.

Coordinator-General's conclusion

Under the above scenario, my report will contain a number of conditions specifying what needs to be done by the proponent as Phase A and B conditions, with, and after, their application for environmental authority. The draft model conditions are provided in Appendix 2 Part 3, for the information of the proponent. **However I state that** they are a guide as to environmental authority conditions that may be imposed, and actual conditions imposed by DERM as a result of assessment of the project's EM Plan submitted with its application, may be different. The EA can be based on the model conditions, with requirements through Phase B conditions for certain plans to be submitted to the Coordinator-General and DERM before CSG development activities commence.

The first operational plan showing field development plans for up to three years will be prepared prior to activities commencing. **I require** this operational plan to be prepared in accordance with Condition 6 Appendix 2 Part 2.

Prior to the first operational plan expiring, which may be in 3 years time, a new operational plan needs to be submitted for subsequent development within the envelope of the EA.

7.6 Coal seam gas water

The gas extraction process releases water under pressure within the coal seam. As coal seams are dewatered the volumes of water pumped typically decreases over time and the gas production increases as the coal seam is dewatered.

Stage 1 activities will remove approximately 50 ML of water ("Coal Seam Gas water") from coal seams per day during the first 10 years of the Gas Field development (2010 – 2020), and 30 ML/day in the following 10 years (2020 - 2030), with approximately 80 ML/day produced during peak production. Approximately 70 per cent of this volume will be produced in the Fairview field. The Roma and Arcadia Valley fields are expected to produce 20 per cent and 10 per cent of total Coal Seam Gas water volumes respectively. This (typically saline) underground water will be brought to the land surface.

Annual volumes of Coal Seam Gas water, may potentially equate to 18,250 ML per annum in the first 10 years, and 10,950 ML per annum for the subsequent 10 years.

Queensland's emerging LNG industry is outlined in the publication *Blueprint for Queensland's LNG Industry* (Queensland Government, 2009). A recent Queensland Government scoping study assessing impacts of the CSG field development found that, over a 20 year period, an emerging LNG industry of up to 44,300 PJ of gas production could produce 11,200 GL of Coal Seam Gas water.

Coal Seam Gas water typically contains significant concentrations of salts, has a high sodium adsorption ratio (SAR) and may contain other contaminants (e.g. hydrocarbons) that have the potential to cause environmental harm if released to land or waters through inappropriate management.

DERM has produced an analysis of environmental aspects of Coal Seam Gas water in a report entitled: *Assessment of the salinity impacts of coal seam gas water on landscapes and surface streams (Coal Seam Gas Water Feasibility Study)*, DERM, Version 2, January 2010). Salinity of CSG water is variable; with total dissolved solids (TDS) values varying from 200 to over 10,000 mg/L. As a comparison, rainwater TDS values are around 20 mg/L, Great Artesian Basin water is around 470-670 mg/L, and freshwater ranges from 0-1,000 mg/L. The salts content is over 50 per cent sodium bicarbonate.



Salinity data presented in the SEIS – Attachment D3 – Associated Water for the GLNG project and based on limited sampling reports that the Arcadia Valley field shows salinity levels (TDS) range from 7,000 - 10,000 mg/L (mean 8,700 mg/L). Roma field ranges from 1,100 - 2,500 mg/L (mean 2,050 mg/L), and Fairview field ranges from 200 mg/L to 16,000 mg/L (mean 1,500 mg/L). A weighted average salt concentration of 3,000 mg/L (TDS) has been assumed, as a middle ground of the fields, for the purpose of quantifying cumulative salt totals in this Coordinator-General report.

Hence based on production of 18,250 ML per year of CSG water, at an average concentration of 3,000 mg/L (TDS) approximately 55,000 tonnes of salts may be brought to the surface per year of the GLNG project up to 2020. By comparison the Port Alma salt fields of Central Queensland produce up to 250,000 tonnes of sea salt per annum. However given the widespread nature of the potential footprint of the CSG industry, salinity risk will need to be managed at various levels.

7.6.1 Management of coal seam gas water

The proponent's proposed mitigation and management of CSG water is outlined in EIS, section 6, and in the Supplementary EIS (SEIS), Attachment D3. The proponent has not provided quantitative estimates of the proposed impacts to surface waters. The CSG water management strategies presented are not comprehensive enough to determine that they are adequate in preventing environmental impacts, and the following analysis indicates the areas of concern to DERM and other agencies.

7.6.2 Irrigated cropping and/or forestry and dust suppression

The Associated Water Management Plan in Attachment D3 of the SEIS proposes that CSG water that is of "low" to "moderate" salinity (<2,500 mg/L (TDS), and <3,500 μ S/cm) will be used for irrigation purposes. Prior to irrigation the water is proposed to be chemically "amended". It should be noted that the "amendment" process does not involve salt removal, but rather involves reducing the pH level, and adding calcium and magnesium to balance excess sodium (i.e. to reduce the Sodium Absorption Ratio). In fact, the "amendment" process is likely to increase the salt load appreciably, potentially by a factor of 1.2.⁴⁵

The EIS indicates that the volumes of "amended" water proposed for irrigation in the Roma and Arcadia Valley fields is stated to be 0-15 per cent of supply, however, the volumes of "amended" water proposed for irrigation in the Fairview field are not stated. The proponent is presently trialling a hardwood drip-irrigation scheme in the Fairview field. A 2,000 hectare plantation of Chinchilla White Gum (*Eucalyptus argophloia*) will be irrigated with approximately 14 ML of "amended" water per day.

The Associated Water Management Plan presented in the EIS proposes that CSG water that is of "low" to "moderate" salinity (<2,500 mg/L (TDS), and <3,500 μ S/cm) will be used for dust suppression. The volume of water proposed for dust suppression in the Roma and Arcadia Valley fields are stated to be approximately 10 per cent of supply. The volumes proposed for dust suppression in the Fairview field are not stated.

Concerns of Department of Environment and Resource Management

DERM has developed operational policy documents relating to the strategies for managing CSG water. The Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities* provides further detail on preferred and non preferred options for managing CSG water.

DERM has developed draft documents outlining the criteria for beneficial uses of coal seam gas water, for the benefit of proponents in developing CSG Water Management plans, and for the DERM in assessing proposals for approval. These documents include:

⁴⁵ DERM has roughly estimated that if we were to use, for example, a starting salinity of 1000 mg/L and assume that half the volume of salt is NaHCO₃ (i.e. sodium bicarbonate) and the sodium bicarbonate is neutralised with H₂SO₄ (i.e. sulphuric acid), we produce Na₂SO₄ (which is 15 per cent lighter per unit of sodium contained), resulting in a decrease in salt content by about 7 per cent. Adding gypsum (CaSO₄.2H₂O) will add approx. 20 per cent of additional solids. Therefore to estimate the final salt volumes, we need to multiply the CSG water salt volumes (produced from gas field groundwater) by about 1.2 to account for the "amendment" process.

- *Approval of coal seam gas water for beneficial use, pursuant to Section 13(4) of the Environmental Protection Act 1994 and Part 6A of the Environmental Protection (Waste Management) Regulation 2000, (DERM, 31 March 2010)*
- *Healthy Headwaters study: Characterisation of salinity limits related to the use of CSG water for irrigation (DERM, January 2010)*

Recent analysis by DERM of the degree of restriction on use for salinity values of >2,000 mg/L (TDS) is ranked as “severe”, as concentrations greater than 2,000 mg/L pose a potential irrigation problem. As a comparison, typical TDS limits for irrigation of moderately salt-sensitive crops is 870 mg/L and salt-sensitive crops is 435 mg/L.

Beneficial uses should consider the following for irrigation:

Minimum standards

The following criteria apply to the general approval for beneficial use of CSG water for irrigation purposes:

- irrigation shall not be applied to Good Quality Agricultural Land
- irrigation shall not be applied to land where the standing water table of an aquifer that is in productive use is less than 30 m from the ground surface anywhere within the planned irrigation area
- the maximum electrical conductivity (EC) shall not exceed 3,000 $\mu\text{S}/\text{cm}$
- the maximum sodium adsorption ratio (SAR) shall not exceed 8
- the maximum bicarbonate ion concentration shall not exceed 100 mg/L
- the maximum fluoride concentration shall not exceed 1 mg/L
- irrigation techniques shall only include drip, centre pivot or lateral move irrigation machines fitted with low energy precision application systems
- flood or related surface irrigation is specifically excluded
- the annual water application rate shall not exceed the water deficit (calculated on a daily basis),
- deep drainage, due to irrigation, shall not exceed 15 per cent of the rate of irrigation water applied to the surface
- irrigation shall not be undertaken in circumstances where soil erosion is likely to occur
- irrigation shall not be undertaken at a rate that results in water run-off to permanent water courses.

I note that the proponent's *Associated Water Management Plan* does not provide site-based details regarding locations and environmental values, and corresponding volumes, quality and application rates of “amended” CSG water to be used for irrigation.

Further **I note** that the proponent's *Associated Water Management Plan* does not provide details regarding expected accumulation of salts in soils and waters, and the associated long term impacts associated with irrigation.

Based on the information presented in the EIS and SEIS, the proposed CSG water management strategy would not be consistent with the standards proposed on these documents. Santos proposes to irrigate and suppress dust with large quantities of saline water (“amended”) in excess of the limits proposed in DERM's guidelines (31 March 2010)

These levels are in excess of the limits proposed in DERM's guidelines (finalised March 2010) shown above.

Significant damage to soil structure and function can occur as a result of incompatible water-soil interactions in a similar way to the application of other saline and sodic waters to irrigation. Repair of the soils may take decades, or may not be possible at all.

Parties proposing to use CSG irrigation water should engage professional advice and assistance in order to understand and manage site specific soil-water interaction, agronomic, monitoring, and irrigation management issues. Further information on the use of CSG irrigation water and its limitations will be



developed under the *Healthy Head Waters: Coal Seam Gas Water Feasibility Study – Activity 3, Landscape Salinity Study.*”

Further, the above Queensland government CSG study cautions as follows: ...”*The effects of salinity and sodicity in irrigation waters are very site-specific making it inappropriate to set general water quality triggers that will address each application at every site. Soils in the region have a diverse range of properties and management requirements, making a one-rule fits all option inappropriate. It is crucial to remember that the cost of ‘getting it wrong’ is large. It takes a reasonably long time for groundwater systems to respond to increased drainage, with time scales in the order of decades. This means that the response to improved management is also slow—once you get a problem, it can take a long time to fix’.*

The Queensland government is party to the Australian Government *Water Act 2007* that seeks to limit cross border salt transport into the Murray-Darling Basin. Production, use and disposal of CSG water has been identified as potentially accountable actions because of their mobilization of salt. Applying saline CSG water to land to west of the Great Dividing Range may result in migration over time of that salt into the Basin. Underlying groundwater tables are shallow. The southern section of the Santos GLNG Gas Field falls within the Murray-Darling catchments. Therefore the proponent must demonstrate that any beneficial use or discharge of CSG water will not have an adverse impact on stream salinity and are sustainable in the longer term.

I note that the Queensland Government considers use of CSG water for dust suppression as a form of small scale irrigation. According to the DERM Guideline: *Approval of coal seam gas water for beneficial use*, CSG water may be used for dust suppression for construction activities, however, only in accordance with minimum specified water quality standards, and not for a period exceeding 3 months in any one location. **I note** that any proposed ongoing use of CSG water for dust suppression, is only acceptable where there has been a formal impact assessment on the application of saline water at that location (including surrounding soils). **I note** that over-application of water could be seen as disposal of CSG water, and will therefore not comply with a beneficial use approval. The risk of damage to soils and ecosystems is likely to preclude application of CSG water without suitable treatment.

7.6.3 Coordinator-General’s conclusion

I note there are ongoing concerns about the general environmental risk posed to surface streams, soils and landscapes by the inappropriate use and disposal of CSG water, as raised by DERM reports assessing CSG water impacts. **I also note** the potential obligation on the Queensland Government to ensure that actions it approves do not increase downstream salinity in the Murray-Darling Basin.

I find that the proposed concentrations of contaminants in GLNG “amended” CSG water (i.e. CSG water <2,500 mg/L (TDS) and <3,500 μ S/cm, plus additional salts from the “amendment” process) exceed acceptable limits identified in Queensland government guidelines for beneficial use. **I find** that CSG water may be used for dust suppression for construction activities, however, only in accordance with the following water quality standards, and not for a period exceeding 3 months:

- the maximum concentration of total dissolved solids for CSG water used for dust suppression shall not exceed 3,000 μ S/cm
- the maximum sodium adsorption ratio (SAR) for CSG water used for dust suppression shall not exceed 15
- the maximum bicarbonate ion concentration for CSG water used for dust suppression shall not exceed 100 mg/L
- dust suppression using CSG water can only be carried out in a particular location for a period not exceeding three months, whereupon more permanent solutions for dust suppression shall be developed, if required.”

I find that the guideline *Approval of coal seam gas water for beneficial use* indicates that the proponent may apply under the *Environmental Protection (Waste Management) Regulation 2000* for a specific beneficial use approval, provided that the proponent can demonstrate specific evidence of the sustainability of any proposed use of CSG water that did not meet the ‘general approval’ provisions of the beneficial use guideline. **I require** that any strategy that proposes to make use of these ‘specific approval’

provisions should be included in the CSG water management plan specified in Condition 3, Appendix 2, Part 2 of this CG report.

I find that the proponent has not provided site-based details regarding locations and environmental values, potential beneficial or adverse impacts, mitigation measures and corresponding volumes, quality and application rates of “amended” CSG water to be used for irrigation.

I find that the Santos GLNG Associated Water Management Plan proposal to irrigate using large volumes of saline water does not provide any certainty for the management of significant volumes of CSG water, nor the salt load that it contains. The associated water management proposed to date has the potential to result in widespread, irreversible and serious environmental harm, and cause long-term problems for soils, waters, vegetation, ecosystems, crops and future land use.

It is clear that the extensive use of high salinity water, which is proposed in the associated water management strategy in respect of “amended” water, does not meet the ‘general approval’ standards by reference to DERM beneficial use guidelines. The use of high salinity “amended” water is clearly the area in which major revisions to the strategy need to be concentrated

I therefore require revision of the proponent’s Associated Water Management Plan to ensure it is consistent with the requirements of the DERM guidelines *Preparing an environmental management plan for CSG activities* and *Approval of coal seam gas water for beneficial use* and other QLD government policies relating to CSG water management, or indicates the purposes for which ‘specific approvals’ proposals will be made, including clear evidence of the sustainability of any ‘specific approval’ proposal.

The Queensland Government policy on this subject has now been implemented through legislative amendments to the EP Act through the *South-East Queensland Water (Distribution and Retail Restructuring) and Other Legislation Amendment Bill 2010* which was passed by Parliament on 20 May 2010. The reform amends section 310D (Environmental management plan (EM Plan)) of the EP Act to include the requirement for a CSG Water Management Plan (CWMP). The new provisions will require the EM Plan to provide details on:

- the quantity of CSG water the applicant reasonably expects will be generated in connection with carrying out each relevant CSG activity;
- the flow rate at which the applicant reasonable expects the water will be generated;
- the quality of the water, including changes in the water quality that the applicant reasonably expects will happen while each relevant CSG activity is carried out;
- the proposed management of the water including the use, treatment, storage or disposal of the water;
- measurable criteria (the management criteria) against which the applicant will monitor and assess the effectiveness of the management of the water including criteria for each of the following:
 - the quantity and quality of the water used, treated, stored or disposed of;
 - protection of the environmental values affected by each relevant CSG activity;
 - the disposal of waste, including, for example, salt generated from the management of the water;
- the action that is proposed to be taken, if any of the management criteria are not satisfied, to ensure the criteria will be able to be satisfied in the future.

The legislative amendments also require that each annual return include an evaluation of the effectiveness of the management of CSG water under the measurable criteria {section 310D(5)(e)} for carrying out each relevant CSG activity. On the basis of these findings the administering authority may decide the conditions of the environmental approval require amendment in relation to CSG water management.

The content requirements for a CWMP have been included in the DERM guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.



Coal Seam Gas Water Management Plan

The proponent shall provide to the Coordinator-General for review a Coal Seam Gas Water Management Plan (CWMP) in accordance with Condition 3, Appendix 2, Part 2.

Brine management

The SEIS states that no definitive final containment option has been selected for brine management. DERM advises me that this does not provide confidence that an appropriate brine management and disposal option has been developed by the proponent. The proponent's long term management of brine is a strategy which needs to be clearly stated for comparison to the Queensland Government's CSG water management policy which prefers reinjection or beneficial use as the options with potential for the least environmental management impact.

Therefore before **I can judge** the adequacy of CSG water management, **I require** that a Brine Management Strategy be formulated and presented to me and to DERM for evaluation against legislation and government policy. This condition appears in Appendix 2, Part 2, Condition 4.

7.7 Groundwater legislation and policy

The Queensland Government's proposed new arrangements (from August 2010) to protect groundwater resources in CSG extraction areas are outlined in the DERM information sheet '*New arrangements to protect groundwater resources in coal seam gas extraction areas*'. Under the new arrangements, the trigger threshold values for impacts on bores will be a 5 m drop for consolidated aquifers, and a 2 m drop for shallow aquifers. These figures are proposed to be set by forthcoming amendments to the *Water Act 2000*.

Under the new arrangements, at the location of a water supply bore, if the impact on water levels exceeds the trigger threshold, and the bore has suffered a significant reduction in its capacity to supply water for the intended purpose, then the bore owner will be able to ask the CSG producer to investigate the situation. The bore owner would need to provide information to the CSG producer in relation to the extent of reduction.

Under the new arrangements, if the bore owner is dissatisfied with the outcomes of the negotiations with the CSG producer in relation to impacts on bore supply, the bore owner will be able to appeal to the Land Court.

Under the new arrangements, CSG producers will be required to periodically prepare and submit underground water impact reports to the Queensland Government for approval. The reports will be required to contain: the results of monitoring; projects of the extent of water level impacts; an inventory of springs where impacts on water levels in underlying aquifers are projected to exceed trigger threshold values, and an assessment of the risk to those springs having regard to matters such as the connectivity of the springs to the underlying aquifers; and a proposal for managing impacts.

In addition, the Queensland Government has committed to develop a cumulative underground water management regime, to manage 'cumulative management areas' where water level impacts of CSG producers overlap. I **note** DERM advises that the Surat Basin is likely to be a single 'cumulative management area'.

7.8 Workers accommodation—CSG fields

7.8.1 Introduction

CSG fields

The coal seam gas field component will involve the development of approximately 2 650 exploration and production wells. About 1 200 wells are expected to be established prior to 2015, with potential for 1 450 or more additional wells after 2015.

The construction of these wells will involve a workforce comprising of local and imported workers, given the very low unemployment rate within the Maranoa region and the lack of skilled labour.

It is anticipated a construction workforce peaking at 1 500 workers in 2013 will be required. The percentage of fly-in, fly-out (FIFO) construction workers is expected to be 90 per cent of the total construction workers and will be accommodated in Temporary Workers' Accommodation Facilities.

In contrast, of the 925 operational workers approximately 50 per cent will be local and accommodated in housing in regional communities.

Supporting infrastructure therefore required for these wells includes both temporary and permanent accommodation facilities to house both construction and operational workforces. Temporary workers' accommodation facilities (TAAF) for the construction phase are proposed to be located close to the gas fields rather than within local communities. Longer term accommodation for operational workers' accommodation is proposed in a number of locations which have not been specified in the EIS. It is proposed that all workers will remain in the accommodation facilities for the duration of their roster regardless of the primary place of residence.

7.8.2 Agency concerns

Queensland Health requires the proponent to ensure drinking water is potable. The Department of Infrastructure and Planning's Maranoa-Balonne Regional Plan *Planning for a stronger more liveable and sustainable community*, September 2009, includes a policy which states the location of new development should support the centres identified in the plan's regional activity centres network, unless a clear need for departure is in the approvals process.

7.8.3 Coordinator-General's conclusion

I note that the location of workers' accommodation for construction is to be for a temporary period and that for operation accommodation will be established for a longer term period. Location will be subject to a range of factors associated with proximity of accommodation to the construction and operational sites, accessibility to services and minimisation of impacts on landholders and local residents. The proposed location of both temporary and longer term workers' accommodation facilities may or may not be in accordance with the existing planning scheme of the regional council. **I find** regional councils will be best placed to identify suitable locations and management measures for potential impacts. There are some overall matters on which **I would nominate** conditions to ensure consistency with state policies and my requirements for accommodation facilities elsewhere in this report. **I direct** that accommodation facilities are not located on good quality agricultural land, since some facilities are likely to be present for a longer term. **I also require** that consideration is given to the appropriate location of these accommodation facilities in terms of minimisation of local and regional impacts by ensuring efficient access to resources, services and facilities and through the protection of amenity, health and safety as well as environmental values.

I have provided conditions on these topics in Appendix 2 Part 1 for the gas fields.



8 Pipeline

8.1 Environmental

8.1.1 Agency advice

The construction of a gas transmission pipeline, despite the fact that this pipeline is a large diameter, follows similar principles to several gas transmission pipelines already built in Queensland, including one along a similar route to that chosen by the proponent. This means that environmental management strategies that are well known can be employed, with special items being addressed by means of additional conditions in the environmental authority, or alternatively placing conditions derived from the findings of the EIS

DERM has advised that the following matters need to be documented, in order to satisfy the information needs of the EM Plan which has to be provided with an application for environmental authority

- the construction methodology for the gas transmission pipeline across: Curtis Island; Callide ranges; sensitive soil areas; and watercourses that still require detailed geological and soil investigations to determine the possibility of horizontal directional drilling
- disturbance to cropping land; GQAL locations
- aquatic values of watercourses where crossings are not HDD
- mitigation measures for endangered Fitzroy and White Throated Snapping Turtles
- hydrostatic test water impact management.

DERM advises that these matters can be addressed in the EM Plan which is to be submitted with the application for the environmental authority.

Also noted in submissions were the issues of potential for effects on stock routes, clearing of native flora under the *Nature Conservation Act 1992*, and impacts on native fauna in accordance with the *Nature Conservation (Wildlife Management) Regulation 2006*.

8.1.2 Coordinator-General's conclusion

I note that the proponent has prepared draft environmental management plans covering construction and operation of the gas pipeline segment of the project, which are outlined in Section 5 of this report. **I accept** that these provide a basis for the management of construction and operation, but that these need to be finalised during the design and planning of the pipeline project.

DERM has provided me with a set of conditions specifying the matters that should be addressed in the EM Plan that accompanies an application for environmental authority for the gas transmission pipeline. **I therefore nominate** Conditions 1 to 3 in Appendix 3 Part 3 as Coordinator-General's Imposed conditions for this process of preparing EM Plans.

DERM has also provided me with the set of proposed environmental authority conditions which would apply if an EM Plan addressing the required matters for the gas pipeline demonstrates that the criteria in the conditions can be met. **I therefore nominate** conditions for the environmental authority (pipeline licence) that appear in Appendix 3 Part 4.

I have elsewhere discussed the construction methodology for the crossing of the Narrows and the Kangaroo Island wetlands. Since this may be an element of the pipeline project which requires separate environmental impact information to be presented, **I offer the opinion** that it is possible that this may not be delivered in the same timeframe as the EM Plan for the remainder of the pipeline. Hence it is possible that the environmental authority conditions for the balance of the pipeline, in accordance with the

Conditions **I have set** in Appendix 3 Part 1 and Part 2, will apply to the pipeline except for the Narrows and intertidal lands crossing. In such a case **I envisage** that upon receipt of an acceptable EM Plan for the Narrows section of the pipeline, DERM may amend the pipeline environmental authority conditions to include specific conditions for the Narrows crossing.

I also nominate conditions on GQAL, Stock Routes, clearing of native vegetation, fauna management and species management plans, that are to address issues raised by DERM as above, which are contained in Conditions 3 to 7 of Appendix 3 Part 2.

8.2 Workers accommodation—gas pipeline

8.2.1 Gas pipeline

An underground pipeline 435 km in length is proposed to run from the coal seam gas fields to the gas liquefaction and export facility on Curtis Island. The pipeline path, where practicable, will be parallel to the existing Roma to Gladstone pipeline. Pipeline materials will be imported via ship, transported via road and rail, and stored in temporary locations along the pipeline route. 1,000 construction workers are anticipated to be required for its construction, working 10 hours each day.

Of this workforce, 90 per cent of workers are expected to be from outside the direct area, travelling to the project site on a fly-in fly-out basis and will require temporary accommodation. The region which the gas pipeline route traverses is mainly rural in nature, hence dedicated workers' accommodation facilities are proposed for 90 per cent of the workers to overcome the accommodation shortfall in the region through which the pipeline corridor traverses. These workers will be housed in temporary worker accommodation facilities (TWAF's). There will be 2-3 main TWAF's accommodating 100 persons each and 1-2 satellite TWAF's accommodating 100 persons each, which will move along the route as the pipeline is constructed. One additional temporary facility is proposed at Friend Point to house 100 workers.

Construction of the pipeline will begin in Gladstone and finish in Fairview. Workers will fly into Gladstone or Roma and be transported via a 20-seater 4wd bus to the TWAF's.

Santos has identified 110 private landholders directly affected by the gas transmission pipeline with a further approximately 20 landholders that may be affected as a result of possible route alignment adjustments.

8.2.2 Agency concerns

Banana Shire Council is seeking further consultation in order to identify any issues and impacts on and for the local area, particularly in relation to workers' accommodation location and waste disposal. Gladstone Regional Council has also expressed a desire for the location of workers associated with the LNG plant, Narrows crossing and/or Gladstone end of the pipeline to be located on the mainland. Other regional councils have expressed concerns for environmental impacts as a result of the construction of the various components of the facility which will include accommodation. These environmental impacts have been covered in Section 8.1 of this report.

The Maranoa Regional Plan's policy states the location of new development should support the centres identified in the plan's regional activity centres network, unless a clear need for departure is demonstrated.

8.2.3 Coordinator-General's conclusion

I note the locations of TWAF for construction of the gas transmission pipeline will be for a temporary period. Location will be subject to a range of factors associated with proximity of accommodation to the construction sites, accessibility to essential services and minimisation of impacts on landholders, local residents and the environment. The location of these accommodation facilities may or may not be in accordance with the existing planning scheme of regional or local councils. **I find** the regional and shire



councils will be best placed to identify suitable locations and management measures for potential impacts when locating these facilities. **I am proposing** to direct the following conditions to ensure consistency with state policies and my requirements for accommodation facilities elsewhere in this report. They involve the appropriate location of facilities in terms of minimising impacts, amenity, health and safety, the provision of services and facilities, the protection of environmental values as well as provisions for energy efficiency.

I have provided conditions on these topics in Appendix 3 Part 2 for inclusion in the petroleum lease pipeline license conditions for the gas transmission pipeline.

8.3 State Development Area

A material change of use (MCU) application under the SDPWO Act is required for gas transmission pipelines and other infrastructure located in the Callide Infrastructure Corridor State Development Area (CICSDA) and the Gladstone State Development Area (GSDA). These are assessed under the relevant development scheme.

The Coordinator-General is the assessment manager for all MCU applications in the CICSDA and GSDA. In this report, **I have nominated** conditions that should attach directly to any MCU approvals for the gas transmission pipeline and the environmental authority conditions recommended by DERM for the gas transmission pipeline to be applied under the EP Act.

The DIP has undertaken work to identify a preferred infrastructure corridor route from Callide to the GSDA and across to Curtis Island to accommodate gas pipelines. In addition, work has been undertaken with the LNG proponents to identify a northern Infrastructure Corridor within the GSDA and more specifically to identify the crossing of the Kangaroo Island wetlands and The Narrows.

Whilst, GLNG has acknowledged this and stated that their preferred gas transmission pipeline route is within the shared CICSDA and GSDA corridors, the mapped route in the SEIS does not demonstrate this.

Coordinator-General's conclusion

I require that the proposed gas transmission pipeline be located in the identified CICSDA and GSDA infrastructure corridors. The use of a shared corridor is particularly important when crossing the Kangaroo Island wetlands and Narrows to Curtis Island due to the environmental sensitivity of the area. Please see Conditions in Appendix 3 Part 1.

8.4 Narrows crossing

The Kangaroo Island intertidal wetlands and The Narrows are high value marine environments that are located within the Australian Government Great Barrier Reef World Heritage Area and lie directly adjacent to the Queensland's Great Barrier Reef Coast Marine Park to the north.

The GLNG gas transmission pipeline route from the gas fields to its LNG facility on Curtis Island proposes to cross this environmentally sensitive area. Apart from GLNG, **I am aware** of similar pipeline crossing proposals from two other LNG proponents (QCLNG and APLNG) and it is an option for a third proponent (SALNG). These other LNG proponents, which also have projects declared as significant projects under the SDPWO Act, are at varying stages of conducting environmental impact statements for fundamentally similar projects involving pipeline crossings of Port Curtis to LNG processing facilities on Curtis Island.

The pipeline routes across the Kangaroo Island wetlands and The Narrows vary among the proponents as does the proposed construction methodologies. All however, are considering open trenching for all or part of the total length involved of approximately 5.4 km - comprising 3.4 km of inter-tidal wetlands around Kangaroo Island and a 2 km waterway crossing at The Narrows. The Narrows waterway is the shortest distance between the mainland and Curtis Island at the head of Port Curtis.

Information in the GLNG EIS as well as those of other LNG proponents, indicate that acid sulphate soils are likely to be a problem, particularly so, in the intertidal wetlands where soil disturbance could lead to creation and release of acid material, which could cause significant environmental harm to flora and fauna within the wetlands and surrounding areas including the Great Barrier Reef Coast Marine Park. It is critical that the extent of disturbance be restricted and acid producing potential managed effectively.

Advice from the Department of Environment and Resource Management (DERM) and the Department of Employment, Economic Development and Innovation (DEEDI) is that it will be difficult to manage cumulative impacts arising from sequential single pipeline crossings of the area by each of the LNG proponents which could involve up to four crossings over varying timeframes. The considered advisory agency view is that overall environmental impacts could be minimised, monitored and managed effectively by co-locating all pipes in one trench and undertaking construction concurrently. **I support** this view.

On 25 February 2010, in response to a request from DIP, a technical working group comprising representatives of the four LNG proponents submitted a high level engineering concept report for simultaneous installation of four gas pipelines across the Kangaroo Island wetlands and The Narrows (GLNG Pipeline FEED—Report of Mechanised Marine Crossing Installation Concept). The report demonstrates the engineering feasibility of constructing multiple pipelines as a bundle whilst potentially minimising soil disturbance and environmental impacts. Further work would need to be undertaken to fully assess environmental impacts. The approach also provides an opportunity for services such as water supply, sewerage, and telecommunications to be included in the trench and to indirectly reduce environment impacts in other areas, by obviating the need for multiple reverse osmosis plants on the island to supply fresh water and obviating the need to dispose of treated sewerage into Port Curtis. Advisory agencies have reviewed the report and support the approach.

There is general support from LNG proponents for a bundled pipeline construction methodology across the wetlands and The Narrows provided the approach does not compromise individual project timings. The project timelines for the first three LNG projects (GLNG, QCLNG and APLNG) are broadly similar with construction scheduled to commence from late 2010/2011 through to 2013 and with LNG exports scheduled to commence in 2014. SALNG has scheduled LNG exports to commence in 2014/2015. Given that proponents are projecting pipeline construction times of 18 months to two years, it is reasonable to conclude that construction of individual pipelines could be scheduled to allow for concurrent construction of a bundled pipeline across the Kangaroo Island wetlands and Narrows section without any or very little constraint to individual overall project timings.

Nonetheless, **I am cognisant** of the proponents' concerns in this regard and in order to minimise impacts on individual project timelines from a bundled pipeline construction methodology, **I propose** that:

- a) approvals for the gas transmission pipelines from the gas-fields to the Kangaroo Island wetlands and from Laird Point to individual LNG facilities be issued to allow construction of these segments to proceed independently of the Kangaroo Island wetlands and The Narrows section.
- b) a period be set for LNG proponents to successfully negotiate an agreement for a bundled pipeline construction solution across the Kangaroo Island wetlands and The Narrows.

Both DERM and DEEDI have indicated that separate environmental authority and pipeline licence approvals for pipeline sections are permissible under current legislation and administrative arrangements. Once all approvals are in place these may be amalgamated into a single environmental authority and a single pipeline licence.

Coordinator-General's conclusion

The Kangaroo Island intertidal wetlands and The Narrows are high value marine environments that are likely to suffer environmental damage from cumulative impacts arising from sequential single pipeline crossings of the area by each of the LNG proponents. **I am of the view** that overall environmental impacts in the area can be minimised, monitored and managed effectively by co-locating all pipes in one trench and undertaking construction concurrently by way of a bundled pipeline trenched construction methodology. **I therefore** impose the conditions shown in Appendix 3, Part 2, Conditions 18 to 26.



9 LNG plant

9.1 Environmental

9.1.1 Agency advice

In principle, the LNG Facility activities consist of a number of elements which are often involved in industry developments including site clearing, construction, water and sewage treatment, waste management, air emissions, concrete batching, chemical storage and other environmentally relevant activities. As such, the management of these can be regulated by a set of conditions applied through an environmental authority attached to the petroleum facilities licence for the site.

While the general impacts outlined in the EIS and SEIS have been assessed and understood concerning the development of the site and the first train of an LNG plant, to fully complete the approval process for the site development and the first train of the LNG plant, further details and assessment need to be provided on the following elements of the LNG Facility:

- the construction method and design of the materials off-loading facility structures including any temporary structures both on Curtis Island and on the mainland
- product export jetty construction methodology, particularly across inter-tidal areas
- LNG facility construction details including the design of power plants, the reverse osmosis water treatment plant, sewage treatment plant, and associated intake and outfall diffuser, and the waste management of contaminants removed from the CSG prior to liquefaction.

DERM has indicated that the normal process to provide these details is in a fully developed Environmental Management Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the environmental authority. Accordingly, **I have specified** the provisions which should be included in such an EM Plan as Condition 2 in Appendix 4 Part 3 of this report.

DERM has also indicated that it requires a draft of this EM Plan to be presented for review prior to the application being made. Any comments made on this draft EM Plan need to be incorporated into a revised plan that is submitted together with the application.

9.1.2 Coordinator-General's conclusion

In order to progress environmental approval processes **I require** Conditions 2 and 3 in Appendix 4 Part 3 to be met by the proponent or its contractor in order to present to DERM a complete EM Plan in accordance with section 310D of the EP Act to support the application for an environmental authority for a petroleum facility licence for the LNG Facility on Curtis Island.

DERM also advises that if this is done, a set of conditions based on those reproduced in Appendix 2 Part 2 would be imposed, providing the EM Plan submitted with the application has demonstrated that the standards in these conditions will be achieved. **I note** that this set of conditions encompass the following sections: General; EM Plan; Third Party Auditing; Financial Assurance; Air Emissions; Noise Management; Waste management; land management; chemical storage; monitoring; and complaint and notification procedures. However **I find** that detailed conditions for water management, such as discharges of reverse osmosis water desalination equipment, and discharges of sewerage treatment plants can only be applied after detailed information is supplied to DERM in accordance with Conditions 2 and 3.

In order to assist this DERM environmental authority conditioning process, DERM advises that the proponent will need to clarify an up-to-date position on cumulative impacts on certain environmental values in relation to the multiple LNG facilities. This applies specifically to noise, air emissions, flora and fauna, and the marine environment. The information contained in this assessment will need to be provided in the EM Plan to support the environmental authority application for the LNG facility. Hence I **impose** a condition requiring cumulative impact assessments for these aspects of the LNG facility, as contained in Condition 1 Appendix 4 Part 3.

9.1.3 Other matters relating to the LNG facility

The proponent in the EIS and SEIS, sought to present impacts and mitigation measures of a spoil disposal strategy at Laird Point, in order to provide a disposal option for the dredging of its swing basin and berth. The proposal is not consistent with the Government's intention for the Port of Gladstone Western Basin Dredging Project and Western Basin Master Plan. Furthermore the disposal site is contained largely in a site which has been contracted to another LNG proponent, APLNG. For a disposal strategy to be considered, the application needs to be supported by an "owners consent" for the land on which the disposal is proposed to take place. APLNG has advised in a submission to me on this subject, that it does not support the proposal.

Hence I **would conclude** that owner's consent is unlikely to be obtained for the Laird Point disposal site, and I **cannot support** the disposal of dredge spoil from any part of the GLNG project at the Laird Point site.

There may be certain associated developments planned for outside the petroleum tenure, i.e. operational works in tidal areas, associated with material off-loading facilities (MOF), jetties and ship loading facilities. DERM advises that there is insufficient information to assess these activities, and furthermore it is not my usual practice to deal with operational works judgements. I **therefore state** that this evaluation report does not apply to those activities related to the LNG facility, but which occur outside the proposed petroleum facility licence area.

Such extra-licence area activities should be considered by means of IDAS processes by the relevant assessment manager.

9.2 Workers accommodation—LNG facility

A material change of use (MCU) application under the SDPWO Act is required for the LNG plant, including the associated infrastructure and any temporary workers accommodation located in the Gladstone State Development Area (GSDA). As the LNG plant is proposed to be located in the Curtis Island Industry Precinct (CIIP) of the GSDA the Development Scheme for the GSDA applies. The Coordinator-General is the Assessment Manager for all MCU applications in the GSDA. In this Report, I **have nominated** conditions that should attach directly to any MCU approvals for the LNG plant and the environmental authority conditions recommended by DERM for the LNG plant and associated infrastructure to be applied under the EP Act. In addition, I **have nominated** Coordinator-General Imposed Conditions which I **apply** under the provisions of Division 8 of Part 4 of the SDPOW Act.

9.2.1 Construction workforce

Workforce numbers

The expected peak workforce for train 1 has been estimated to be 2161⁴⁶. The peak construction workforce required for trains 1 and 2, based on a modular construction method, is estimated by GLNG to be about 2,787 workers. Hence the peak increase for the workforce is between 500-600 lasting approximately 14 months compared to about 6 months for train1 only⁴⁷.

⁴⁶ Peaks between 18 to 24 months

⁴⁷ Peaks between 30 and 40 months



In addition to the GLNG proposal, there are three (3) other LNG plants proposed on Curtis Island. Using the workforce data provided by proponents, it is estimated that a construction workforce of about 9,000 to 12,600 will be required to construct all four (4) proposed LNG plants during the peak construction years.

I have had some difficulty in determining the size of the construction workforce for each LNG plant and the total construction workforce if all projects were to be developed due to lack of clarity and certainty regarding:

- actual workforce numbers and the size of the non local workforce due to provision of inconsistent documentation throughout the EIS process
- the stated timing of construction of the LNG plants, is not reliable because the construction timetable will be driven by market forces
- reliability of the projects proceeding.

Santos estimates that 28 per cent of the workforce for trains 1 and 2 will be local. Consequently, if the total workforce is 2 787, the number of imported workers will be approximately 1 950. It has been estimated up to 270 workers will be attracted to live in Gladstone and therefore require housing.

To determine the cumulative effects of all the LNG plants proposed to be constructed on Curtis Island I **used** each of the proponent's expected proportion of local workers, to estimate that approximately 8 000 non local workers will be required to be accommodated in the Gladstone area. It is important to note, that the proportion of local workers used by each LNG proponent is based on their project being the first or only LNG plant being constructed. Consequently, if there is more than one LNG plant being constructed at any one time, the proportion of local workers will decrease and the number of non local workers will be greater.

A potential influx of 8 000 people would significantly increase the existing population of Gladstone. Using the medium population projections prepared by the Population Forecasting and Information Unit of Queensland Treasury for the Gladstone Regional Council area, an additional 9000 to 12,600 people would equate to an increase of about 20 per cent to the existing population of about 63,000 or about 20 per cent of the FTE workforce of the Gladstone region. **I believe** that a population and workforce increase of this magnitude over a relatively short period of time will have significant impacts on the existing Gladstone community. Consequently, each LNG plant requires an accommodation strategy for the non local workers.

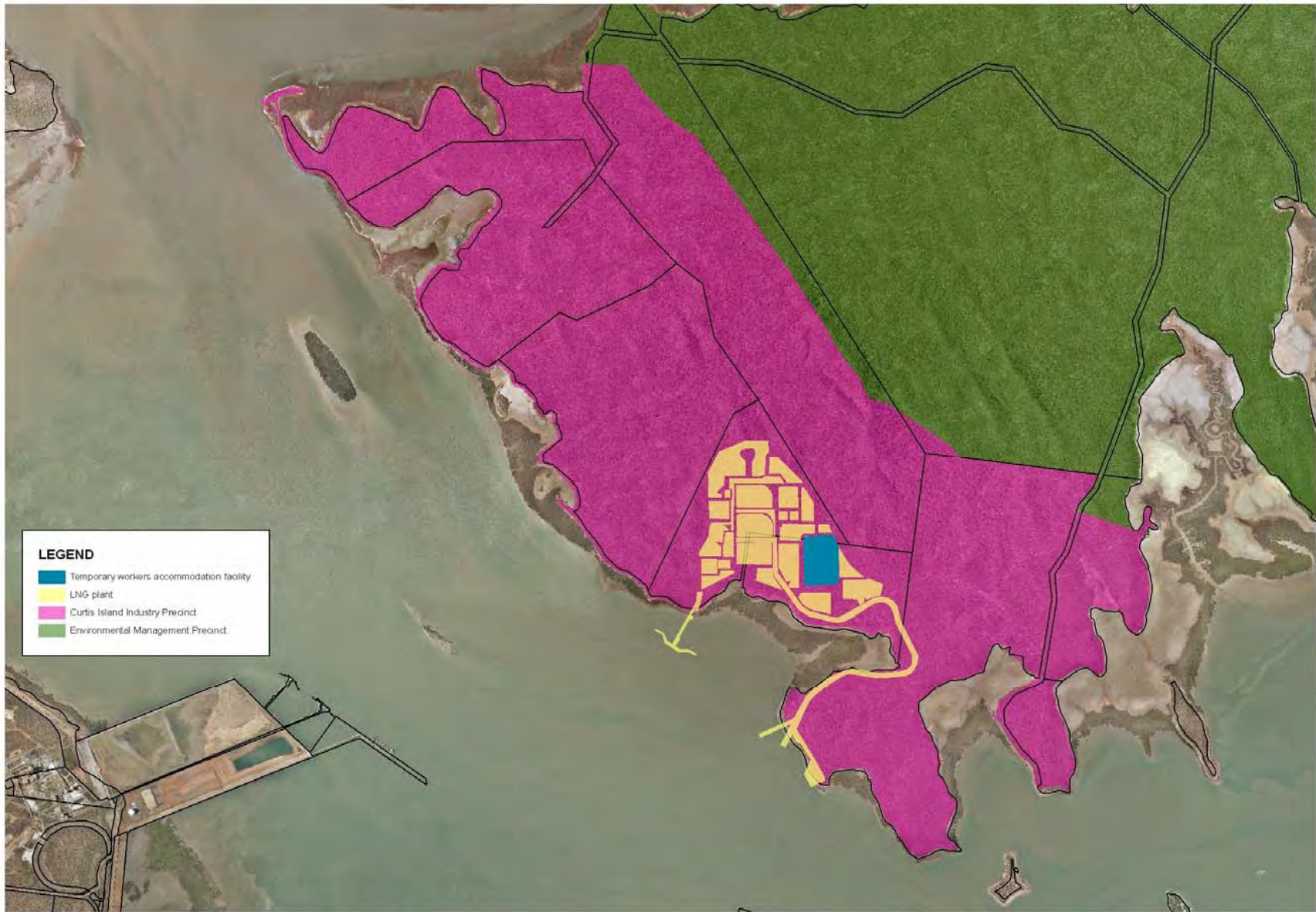


Figure 1: Proposed general site plan of GLNG facility on Curtis Island



Impacts of alternative accommodation strategies

In the EIS and the SEIS, Santos considered a range of accommodation strategies to accommodate the LNG construction workforce. The accommodation strategies considered included the construction workers residing in:

- the Gladstone community
- a mainland TWAF
- a combined TWAF on Curtis Island
- a project specific TWAF within the GLNG site.

The assessment criteria used by Santos to assess the accommodation strategies included:

- cost to industry
- traffic impacts
- social, community and economic impacts
- environmental impacts
- health and safety issues.

Each LNG proponent identified similar alternative accommodation strategies and assessment criteria. In most cases the assessment of impacts undertaken by GLNG was a theoretical exercise as the only accommodation strategy described in detail was the proponent's preferred option of accommodating most of the construction workforce in a TWAF on their LNG plant site on Curtis Island. All other options did not consider the type, size or location of the workforce accommodation. In addition, the assessment criteria used by the proponents was heavily weighted towards the cost to industry. Consequently, **I believe** that the assessment of the alternative accommodation strategies undertaken by the proponents did not fully consider the full range of social and environmental impacts, including the impacts identified by the EIS submitters.

Impacts of accommodating the construction workforce in the Gladstone community

Agencies have advised, and in particular the Gladstone Regional Council, that a potential influx of 2 000 to 8 000 people would significantly increase the existing population of the Gladstone community and have a number of social and economic impacts including:

- pressure on housing and impacts on housing affordability
- pressure on infrastructure and community services
- opportunities for legacy infrastructure and community services
- increased spending in the Gladstone community
- inflated living costs
- potential conflicts in the recreation needs of the construction workers and the Gladstone community
- risk of anti social behaviour
- change in the demographics of the community.

I accept that it will be difficult for Gladstone to accommodate such a large population increase over a short period of time. Consequently, **I will examine** a proposal to locate a TWAF within the CIIP of the GSDA.

Impacts of workers living in a TWAF on the mainland as opposed to Curtis Island

All LNG proponents acknowledge that locating TWAF on the mainland, when compared to a Curtis Island location would:

- be cheaper to construct and operate
- have less environmental impacts in terms of vegetation clearing and waste disposal
- provide the workforce with better social, community and health services.

However, the LNG proponents believe that these benefits are outweighed by the costs, in terms of money and productivity, associated with transporting construction workers daily to Curtis Island.

Whilst it is acknowledged that the cost of transporting the workforce daily to and from Curtis Island would have significant money, time and productivity costs, the proponents' assessment of the impacts did not provide sufficient evidence that the costs to industry would outweigh the benefits of locating the construction workers in or near the Gladstone community.

Locating the TWAF on the mainland would increase road and marine traffic in the Gladstone area. It is estimated that each LNG plant will require an additional 66-80 bus trips and 16 ferry trips per day. However, an island TWAF would decrease the number of proposed barge trips by 20 per cent equating to 6 barge trips per day for each LNG plant.

Impacts of a shared TWAF as opposed to individual TWAF's for each LNG plant

The proponents acknowledge that a shared TWAF will be cheaper to build and operate. However, they believe that the cost savings are outweighed by the following issues:

- an increased risk of loss of intellectual property associated with the LNG plant
- an increased risk of industrial action as workers on different projects will have different workplace agreements and conditions
- an increased risk of social dysfunction and anti social behaviour due to such a large single demographic community
- increased costs of transporting workers to the construction site if it is located on Curtis Island.

A single TWAF on Curtis Island may have additional environmental impacts as it will require:

- an additional water supply to that already planned at each LNG plant
- an additional waste water treatment plant to that already planned at each LNG Plant
- additional road infrastructure to travel between TWAF and the LNG Plant sites
- additional clearing for the TWAF and associated infrastructure, including roads as the proposed TWAF's on Curtis Island are generally located within the development footprint of the LNG plant.

Consultation undertaken by DIP with the industry involved in construction and operation of temporary worker accommodation facilities in Queensland has indicated that to achieve the economy of scale and an appropriate and suitable range of services at a TWAF, a minimum of 800 sleeping compartments is required. However, this economy of scale is lost once the TWAF exceeds about 1 500 sleeping compartments. Considering this and other factors, **I believe** that a combined TWAF may not be appropriate from an operational perspective.

The preferred accommodation strategy

GLNG's preferred accommodation strategy is to house 62 per cent of the LNG plant construction workforce in TWAF located within the GLNG plant site on Curtis Island. This is based on GLNG's strategy of housing 87 per cent of the non local workforce on the LNG plant site on Curtis Island. The remainder of the fly-in workforce plus the local workforce will live in the Gladstone community and will travel daily to Curtis Island when they need to work at the site.

The TWAF is proposed to be self contained with no opportunity for workers to leave the LNG construction site. The 12 hectares TWAF is proposed to include the following:

- 1 680 single occupancy sleeping compartments with en-suite and individual air conditioners
- dining room and kitchen where all meals are provided
- bar
- facilities for passive recreation such as TV watching, reading and computer activities;
- facilities for active recreation such as swimming, gym and team sports
- cleaning and laundry facilities
- offices and training rooms
- shop and or post office



- medical clinic.

The utility infrastructure proposed to support the GLNG TWAF includes:

- desalination and water treatment with brine being discharged into Port Curtis
- waste water treatment with effluent being discharged into Port Curtis
- waste disposal strategy with solid waste and recyclables to be transported and disposed in Gladstone
- telecommunications.

Impacts of GLNG's preferred strategy

Each LNG proponent has identified that a TWAF, accommodating up to 2 000 workers located on the LNG plant site is their preferred accommodation strategy.

Whilst this is the proponent's preferred approach to accommodate a large proportion of the construction workforce on Curtis Island, the consultation for the EIS and SEIS identified a number of issues associated including:

- temporary workers accommodation is inconsistent with the GSDA Development Scheme
- the safety of workers living near a hazardous industry
- concern about the impact construction workers may have on the existing South End community, the sensitive environment of Curtis Island and the Great Barrier Reef Marine Park
- the loss of economic benefits and opportunities for legacy infrastructure for the Gladstone community
- the environmental impacts of the water treatment, wastewater and waste disposal required to service the temporary workers accommodation.

I am concerned about the discharge of brine and effluent into Port Curtis. The current GLNG proposal is not acceptable to DERM. The proponent has failed to consider the full range of utility infrastructure provision options including:

- a single desalination (reverse osmosis) and water treatment plant and single sewage treatment plant on Curtis Island - economies of scale could create better outcomes, however there may be difficulty in cooperation between the proponents
- all water and effluent piped to and from the mainland, noting that there may be a difficulty in the timing of delivery of this infrastructure.

9.2.2 Operational workforce

The LNG plant will operate 24 hours a day, 7 days a week. The proposed on site operation workforce is shown below.

Table 9.1 – LNG Operation Workforce

Staff type	Work hours	Number shifts	Workforce numbers
Maintenance	Monday - Friday 07:00-16:00	1	30
Operations	7 days 06:00-18:00/18:00 – 06:00	4	20
Administration	Monday - Friday 07:00-16:00	1	30
Total on site			80
Total employed			140

It is proposed that the operational workforce will live in the Gladstone area and travel daily from Auckland Point to Curtis Island. However, it has been identified that some workers accommodation of up to 110 single units will be required on site during operation to cater for unscheduled maintenance operations and emergency accommodation for when travel back to the mainland is not safe.

9.2.3 Coordinator-General's conclusion

It will be difficult for Gladstone to accommodate the influx of the large construction workforce over a short period of time. Consequently, **I will consider** a proposal to locate a TWAF within the CIIP of the GSDA.

However, before any temporary workers accommodation locates on Curtis Island **I need to be satisfied** that the proposal does not:

- allow workers to live in an area that has significant injury risk (see Section 9.3 – Hazard and Risk),
- compromise the purpose of the CIIP land use designation, the GSDA Objectives and/or the integrity of the GSDA, and
- detrimentally impact on environmental values of adjoining Curtis Island Environmental Management Zone and the Great Barrier Reef Marine Park.

This will be assessed as part of the MCU development application.

If I am satisfied that temporary workers accommodation on the GLNG plant site is appropriate, **I judge** that the size of the TWAF on the GLNG plant site may be up to 1500 single units, but may be larger if a proposal can demonstrate safety to the workers living in close proximity to a hazardous industry and the purpose of the Curtis Island precinct and the GSDA objectives and integrity of the GSDA will not be compromised. **I will take into account** the accommodation strategy documented in the GLNG Supplementary EIS, nominating that 62 per cent⁴⁸ of the construction workforce is to be accommodated in an on-site TWAF on Curtis Island. The size of 1500 units also reflects the optimal size, identified by industry providers, of a TWAF for operational efficiency.

Due to the environmental sensitivity of Port Curtis, **I require** stringent quality standards for effluent discharge into its waters. See condition in Appendix 4, Part 3, Schedule C, Table 1. If this cannot be achieved, **I recommend** the infrastructure required to service the TWAF including water; waste water treatment and telecommunications must be brought from the mainland. The pipes bringing these services are to be located in the infrastructure corridor of GSDA including the crossing of the wetlands and The Narrows.

To ensure that workers do not damage the sensitive environment of the Curtis Island Environmental Management Zone and the Great Barrier Reef Marine Park, entry into the Curtis Island Environmental Management Zone is prohibited for all construction workers. **I require** the proponent or its contractor to provide for the payment of penalties for any environmental damage that may be caused by GLNG employees. This is contained in Condition 5 Appendix 4 Part 2.

Since, any accommodation on Curtis Island will be a temporary arrangement, **I require**, on completion of construction, any TWAF, must be removed and the site rehabilitated. However, **I note** that a permanent accommodation facility of 110 single units is required for the operation of the LNG plant, for emergency accommodation. **I advise** that MCU and building approval will be required for the accommodation associated with LNG plant operation.

The accommodation strategy outlined in GLNG supplementary EIS identifies that at least 13 per cent of the non local workforce will live in Gladstone. Consequently, any TWAF is to be supported by newly created housing in the Gladstone community. If GLNG are not going to provide a mainland TWAF, GLNG will be required to provide a proportion of new dwellings in Gladstone to reduce the pressure on the existing housing stock. In addition to new housing, the LNG proponents will provide a contribution to affordable rental housing in the area. **I have provided** conditions to this effect elsewhere in this report (see section 6.2.6—Housing in the Social and Economic section of this report)

In addition to the pressure on housing, the large influx of people into Gladstone over a short period of time will put pressure on existing infrastructure and community services. To address these impacts **I require** the proponent or its contractor to contribute towards the upgrading of the following infrastructure and services:

⁴⁸ Represents the assumption of a combined Train 1 and Train 2 with train 2 commencing 12 months after train 1.



- water supply infrastructure
- waste water treatment infrastructure
- waste disposal infrastructure including landfill and recycling.

Recommended conditions

Appendix 4, Part 1 presents proposed conditions which are to be attached to the MCU to specify the size and duration of the temporary accommodation facility, an operational accommodation facility, water and sewerage infrastructure, security bond for environmental damage, etc visual amenity.

Appendix 4 Part 2 deals with assessment and criteria for safety of workers in accommodation.

Appendix 4 Part 3 provides Coordinator-Generals imposed conditions prior to the issue of the integrated environmental authority for the LNG facility.

Appendix 4 Part 4 provides the proposed environmental authority conditions for the LNG Facility, which is discussed in Section 9.1 of this report.

9.3 Hazard and risk

9.3.1 Issues of concern

The principal hazard and risk scenarios for the LNG facility involve operation of the plant and loading and shipping of the LNG through the port. Submissions queried the explosion and fire potential from plant operation, and the consequences of shipping collisions in the harbour. Risks during construction were seen as a secondary order of magnitude. However, there was significant concern for safety of a workforce housed on site, not during initial construction, but during subsequent construction programs of second and third trains when the site is in operation or a neighbouring site is operating. One query also raised the issue of risk of seismic event and damage to the plant.

9.3.2 Risk assessment

The EIS conducted a risk assessment of the plant operation, and also discussed the risks of shipping incidents. LNG carrier shipping is reported to be relatively safe from loss of containment because of double hull design which gives secondary protection to the LNG storage tanks even if grounding or collision occurs. The EIS reports no loss of containment from double hull vessels in the past 25 years worldwide. The Gladstone Harbour Master has conducted LNG shipping simulation studies and together with shipowners has designated a policy of two tugs in the outer harbour and four tugs in the inner harbour for berthing of LNG tankers. There will also be a 30 minute departure distance between vessels. With ship design, maintenance and harbour management the analysis concluded that LNG ships in Gladstone Harbour could have one third lower incident rate than other shipping. Analysis of loading risks in the EIS proposed that an exclusion zone of **200m** would be satisfactory.

The EIS indicated that the hazards from operations of the LNG plant are analysed in four ways:

- risk contours taking likelihood and consequence into account
- overpressure from explosions
- heat flux from fires
- vapour cloud flammability.

A risk assessment according to Australian Standard AS/NZS 4360 (now named AS/NZS ISO31000) was conducted and the fatality risk contours from all hazards were drawn on the plant site, from 50×10^{-6} ⁴⁹ (Industrial risk criteria) down to 0.5×10^{-6} (sensitive developments). The assessment showed that all contours, including the residential criteria of 1×10^{-6} per year, were kept within the land site boundaries.

⁴⁹ 50×10^{-6} means 50 chances in a million

(Contours over water surround the ship loading berth resulting in the 200 metres exclusion zone described above.)

Other safety assessments were conducted according to international standard *NFPA59A for Production, Storage and Handling* of LNG. This standard considers end point exclusion distances around sources of overpressure (explosion), thermal radiation (fires, flames), or spills of flammable liquids (LNG). While the results of these assessments are complex, and consider many scenarios in a number of critical locations in the plant, they can be summarised as follows:

Table 9.2 - End point exclusion distances for hazards in the LNG facility

Source	Hazard	Criteria	End point—Exclusion distance
LNG Storage tank LNG liquid leak	Fire of LNG in containment bund around tanker	Heat Flux 5kW/m ² thermal radiation ⁽¹⁾	325m
LNG Ship loading vapour leak	Vapour cloud (ignition risk)	Lower Flammability Limit ⁽²⁾	240m
LNG Ship loading liquid leak	Fire of LNG within containment bund	Heat Flux 5kW/m ² ⁽³⁾	70m
Refrigerant storage leaks	Vapour Cloud	½ Lower Flammability Limit ⁽²⁾	412 – 573m
Refrigeration system	Fire	Heat Flux 4.7 kW/m ² Thermal radiation ⁽¹⁾	182-202m
Liquefaction train leak	Vapour cloud	½ lower flammability limit ⁽²⁾	274m
Liquefaction train leak	Fire	Heat Flux 4.7 kw/m ² Thermal radiation	51m
Refrigerant Vapour Cloud	Explosion	Overpressure 7kPa ⁽³⁾	250m
Gas Pipeline inlet leak	Vapour Cloud	½ lower flammability limit ⁽²⁾	191m
Gas Pipeline inlet leak	Fire	Heat flux 4.7kw/m ² Thermal radiation ⁽¹⁾	125m

Note (1) End Point criteria of 5kw/m² (or 4.7kW/m²) is the heat flux not to be exceeded at residential areas.

Note (2) ½ Lower Flammability Limit of a vapour cloud is 50 per cent below the lower concentration at which the cloud can ignite.

Note (3) End Point Criteria of 7kPa is the overpressure not to be exceeded at residential areas.

Using the figures from the above table the EIS indicates that the radius for fire ranges from 51m to 325m for explosion up to 250m and for vapour cloud 274m to 573m. This means that no one located in the open air outside these ranges will experience harmful impacts from these hazards. Persons inside buildings will be shielded from this level of hazard at these distances.

The accepted Australian risk criteria for planning are drawn from the *New South Wales Hazards Industry Planning Advisory Paper No 4 (HIPAP4) Risk Criteria for Land Use Planning*. The criteria for residential areas is 1x10⁻⁶ per year.

The conclusion reached is that if the plant is laid out so as to keep all these contours and the 1x10⁻⁶ risk contour within the site boundary, then there is no unacceptable risk to surrounding sites.

When considering the siting of a construction accommodation facility on the LNG plant site, the EIS concludes that the proposed location for the TWAF Facility is sufficiently far from the above risk contours which surround the plant. In other words there is enough space on the site to ensure that the TWAF is located where the risk contours will not affect it as a residential area.



On the question of seismic risk to the plant, the EIS identified that the structural design of the plant would be governed by *AS1170.4 Structural design: Earthquake Design Actions in Australia*.

Coordinator-General's conclusion

In considering the hazard and risk assessment of the LNG facility, **I note** the study done in the EIS is of the nature of a preliminary hazard analysis and risk assessment as recognised by the Australian Standard. **I accept** that the results of this analysis represent the risk information applying to the project as it is designed now, and are sufficient to make judgements of its risk to the community.

The Queensland legislation applying to this Major Hazard Facility is the *Dangerous Goods Safety Management Act*. Under this Act the Hazardous Industries and Chemicals Branch (HICB) of Workplace Health and Safety Queensland will require a full Safety Report on the facility when designed for construction, including a Systematic Risk Assessment. It is at this stage that refinements to the risk assessment can be made during the detailed design phase of the project.

I have consulted the Hazardous Industries and Chemical Branch and they have advised me that they will require the project to demonstrate by a Systematic Risk Assessment that the project risks are confined within the site boundaries. **I therefore apply** Condition 1 Appendix 4 Part 2 to require the proponent to undertake this assessment.

I accept that the risk assessment in the EIS shows that the fatality risk contours for residential criteria and the injury risk criteria for fire, explosion and vapour flammability lie within the site landward boundaries. Hence **I am of the opinion** that the residential safety criteria are satisfied at adjacent sites. **I therefore nominate** the criteria to achieve this which must be satisfied in the above Systematic Risk Assessment. This appears as Condition 2 Appendix 4 Part 2.

I am aware that the proponent is proposing to locate a construction accommodation facility (TWAF) on the plant site.

In another section of this report **I discuss** the acceptability of this from a planning and environmental view, but from a hazard and risk point of view it would only be satisfactory if the location of the TWAF is such that it achieves the same residential safety criteria as listed in Condition 1.

I have therefore nominated Condition 2 to specify that the residential safety criteria be met at the boundary of the TWAF, which **I have further defined** to include a buffer of 50m around the TWAF as an extra precaution.

I plan to apply these overlapping conditions to other LNG sites on Curtis Island and in so doing, **I believe** that hazard and risk criteria will be confined to each site, and also there will be no risk criteria interaction between sites. **I recommend** that the Hazardous Industries Chemicals Branch, Workplace Health and Safety Queensland take this principle into account when examining the systemic risk assessment of this plant and others on Curtis Island which it will be examining.

On the shipping issue **I am satisfied** that harbour management by the Gladstone Ports Corporation and the LNG shipping provisions of Maritime Services Queensland, through the Regional Harbour Master, will be sufficient to manage the transit of LNG ships through Gladstone harbour in a safe manner.

From the risk and hazard analysis **I note** that for ship loading with LNG the principal hazard is a vapour cloud from a major leak from the loading system. From the End Point Exclusion Distance table above, the distance to the end point of the Lower Flammability Limit is 240m. From this, and examination of the risk contour in the EIS around loading, **I believe** that 250m should be the exclusion distance around the loading of LNG vessels, when LNG transfer is taking place and for 30 minutes after loading. A 250m exclusion zone around LNG ship loading manifold has been set in agreements with the Gladstone Ports Corporation.

Because the hazard contours of a third train were not demonstrated in the hazard and risk assessment, **I make no comment** on its acceptability from a risk and hazard point of view. Nevertheless the two

conditions **I have written** present the assessment and acceptability criteria which any plant site would have to meet if it was expanded.

Therefore, **I have written** Conditions 1 and 2, Appendix 4 Part 2 to apply to the assessment of any TWAF located on the site during construction of a first train, even though the operational risks may not be experienced during initial construction. However, **I believe** they must be applied from the outset to take account of all potential situations which may rise through timing of construction of multiple LNG plants in the precinct.

9.4 Multiple LNG trains

I have been provided with sufficient information on the construction and operation of Trains 1 and 2 of the LNG facility by GLNG on Curtis Island to make effective decisions on their acceptability. This includes environmental, safety, workforce, scheduling, accommodation and description of construction and operation. The proponent's strategy for Trains 1 and 2 is to construct them concurrently, with a start for Train 2 being undertaken about 12 months after Train 1. This strategy is planned to attract and maintain a core of highly skilled trades and specialist workforce to transition from Train 1 to Train 2 and derive significant equipment and labour productivities. This minimises the incremental workforce peak to an additional 600 persons for Train 2 over Train 1, albeit for a longer period.

The period for construction of two trains concurrently is about 60 months, with a peak workforce on the island for about 14 months in the second and third years of the 5 year period.

With regard to approval for the proposed third train of the LNG plant, if the proponent decides to proceed with a third train before the end of four (4) years after this report **I will consider** extending the currency of my report for a further two (2) year period to enable the third train construction to commence within that two (2) year period. **I have set** Condition 8 Appendix 4 Part 2 to reflect my decision on approval for the third train



10 Matters of National Environmental Significance

10.1 Introduction

The proponent lodged an IAS for the GLNG project with the Coordinator-General on 10 July 2007 pursuant to section 26 of the SDPWO Act. On the 16 July 2007 the Coordinator-General declared the Santos GLNG project to be a significant project for which an EIS is required.

This section of the Coordinator-General's report addresses those sections of Part 5 of the SDPWO Regulation which deal with the requirements of the Coordinator-General's report for proposals:

- declared as a significant project for which an EIS is required
- for which the Australian Government has accredited assessment of the relevant impacts pursuant to the SDPWO Act.

In particular, the SDPWO Regulation⁵⁰ requires that the Coordinator-General's report contain, among other things⁵¹:

- a description of feasible alternatives to the project identified in the EIS process and the likely impact of the alternatives on matters of national environmental significance (MNES), and
- a statement of conditions of approval for the project that may be imposed to address impacts, identified in the EIS process, on MNES.

The purpose of this section is to inform the Australian Government in its assessment of the GLNG Project against relevant MNES⁵², identified for the project pursuant to the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (Cth). This section provides an assessment of the extent to which the material supplied (by the project proponent as part of the EIS process) addresses the relevant impacts (actual or likely impacts) of each controlled action for the project, on the matters protected by the each of the relevant controlling provisions.

The EPBC Act is administered by the Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA). This Coordinator-General's report will be provided to the Australian Government Minister responsible for administering the EPBC Act. Information provided by the proponent as part of the EIS process under the SDPWO Act is required to satisfy information requirements of the EPBC Act and DEWHA.

⁵⁰ *State Development and Public Works Organisation Regulation 1999*, Part 5 - Environmental coordination.

⁵¹ Section 17(1) of the SDPWO Reg requires that the Coordinator-General's report contain: (a) A description of (i) the project; (ii) the places affected by the project; (iv) the controlling provisions for the project; (b) A summary of the project's relevant impacts; (c) A description of feasible mitigation measures, changes to the project or procedures, to prevent or minimise the project's relevant impacts, proposed by the proponent or suggested in relevant submissions; (d) To the extent practicable, a description of feasible alternatives to the project identified in the EIS process, and the likely impact of the alternatives on matters of national environmental significance; (e) A statement of conditions of approval for the project that may be imposed to address impacts, identified in the EIS process, on matters of national environmental significance; and (f) A statement of requirements for, and conditions of, approval applying to the project when the report is prepared, including a description of the monitoring, enforcement and review procedures applying, or proposed to apply, to the project.

⁵² MNES as mentioned in the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), Chapter 2, part 3, division 1.

10.2 Project referrals and controlled action decisions

On 14 February 2008, the proponent lodged five separate referrals to the Australian Government under the EPBC Act to cover the project's components (CSG fields, pipeline, LNG terminal, marine environment dredging and bridge).

On 31 March 2008⁵³ and 14 April 2008⁵⁴, the Australian Minister for the Environment, Heritage and the Arts declared all five referrals to be controlled actions under section 75 of the EPBC Act, for potential impacts to matters of national environmental significance (EPBC 2008/4057, 2008/4058, 2008/4059, 2008/4060 and 2008/4096). On 31 March 2008 a decision was also made, pursuant to section 74(A) of the EPBC Act, to accept a split referral for the Santos project to ensure that the Commonwealth can consider the LNG Facility in stages.

The Australian Government has declared that the Bilateral Agreement will be used for assessment. The EIS process under the SDPWO Act is accredited under the Bilateral Agreement and is required to address matters on behalf of both the Queensland and Australian Governments. The controlled actions may be considered for approval under section 133 of the EPBC Act once the Minister has the Coordinator-General's EIS evaluation report from the EIS process prepared under section 35 of the SDPWO Act.

The respective controlling provisions for each component, pursuant to part 3, division 1 of the EPBC Act, are outlined below.

10.2.1 Referrals

Development of CSG Resources - EPBC 2008/4059

The controlling provisions of part 3, division 1 of the EPBC Act that apply to this component of the project are:

- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A)

Gas Transmission Pipeline - EPBC 2008/4096

The controlling provisions of part 3, division 1 of the EPBC Act that apply to this component of the project are:

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

LNG Facility - EPBC 2008/4057

The controlling provisions of part 3, division 1 of the EPBC Act that apply to this component of the project are:

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

⁵³ For EPBC 2008/4057, 2008/4058, 2008/4059 and 2008/4060.

⁵⁴ For EPBC 2008/4096.



Marine facilities - EPBC 2008/4058

The controlling provisions of part 3, division 1 of the EPBC Act that apply to this component of the project are:

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

Bridge, Road and Services Corridor - EPBC 2008/4060

The controlling provisions of part 3, division 1 of the EPBC Act that apply to this component of the project are:

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

10.3 Public consultation

10.3.1 Terms of reference

A number of Australian, state and local government representatives and other appropriate authorities were invited to participate as advisory agencies for the EIS process and to provide comment on draft terms of reference (TOR).

DIP, on behalf of the Coordinator-General, coordinated the consultation process between the proponent, the advisory agencies and the public.

The IAS was released for public information and draft TOR was advertised for public comment on 24 May 2008 in *The Australian* and *The Courier-Mail*. Comments were accepted until the close of business on 20 June 2008.

Advisory agency briefings were held in Brisbane on 10 June 2008.

A total of 32 submissions on the draft TOR were received by DIP: 19 from advisory agencies and 13 from the general public, commercial operations and environmental non-government organisations. Submissions were received from:

Advisory agencies (as at June 2008)⁵⁵

- Australian Government Department of Environment, Water Heritage and the Arts
- Department of Communities
- Department of Emergency Services
- Department of Tourism, Regional Development and Industry
- Department of Primary Industries and Fisheries
- Department of Natural Resources and Water
- Department of Mines and Energy
- Environmental Protection Agency

⁵⁵ Departmental names have been amended through Machinery of Government changes since 2008

- Office of Climate Change - EPA
- Department of Housing
- Department of Transport
- Department of Main Roads
- Queensland Health
- Queensland Police
- Gladstone Regional Council
- Gladstone Ports Corporation
- Western Downs Regional Council
- Maranoa Regional Council
- Central Highlands Regional Council

Private companies and general public

- Gladstone Yacht Club
- Queensland Conservation Council
- National Generators Forum
- Queensland Murray-Darling Committee
- 9 private submitters

The Final TOR⁵⁶ was approved by the Coordinator-General on 20 August 2008.

10.3.2 Environmental impact statement

The EIS was approved for release and advertised publicly on 20 June 2009 in *The Australian*, *the Courier Mail*, *the Rockhampton Morning Bulletin* and *Gladstone Observer*. The EIS was advertised on the 25 June 2009 in the *Surat Basin News*, and on the 26 June 2009 in the *Roma Western Star*, *Dalby Herald* and *Biloela Central Telegraph*. Submissions were invited until close of business on 17 August 2009. A copy of the EIS was available free of charge on the proponent's web site (and hard copies were available for purchase).

Advisory agency briefings were held in Gladstone on 23 July 2009 and in Brisbane on 17 July 2009.

The EIS was displayed at the:

- Roma Regional Council Office
- Dalby Regional Council Office
- Banana Shire Council Office
- Gladstone Regional Council Office
- Santos Ltd Offices, Gladstone, Brisbane, and Roma
- State Library of Queensland, Brisbane

Information on the project was available via DIP's website, the proponent's GLNG web site and free call information hotline. Agency consultation was undertaken through advisory agency briefings.

Advisory agencies were approached formally to conduct an evaluation of the EIS. A list of advisory agencies is provided below.

⁵⁶ TOR can be viewed at <http://www.dip.qld.gov.au/projects/energy/gas/gladstone-liquefied-natural-gas.html>



Following the eight-week public review of the EIS a total of 41 submissions were received by the Coordinator-General, consisting of 20 from advisory agencies, 21 from the general public, commercial operations and environmental non-government organisations as follows:

Advisory agencies

- Department of Communities
- Department of Infrastructure and Planning
- Department of Community Safety
- Department of Environment and Resource Management
- Queensland Health
- Queensland Mines and Energy
- Department of Main Roads and Transport
- Queensland Police
- Department of Employment, Economic Development and Industry
- Queensland Primary Industries and Fisheries
- Queensland Treasury
- Western Downs Regional Council
- Gladstone Regional Council
- Central Highlands Regional Council
- Banana Shire Council
- Gladstone Area Water Board
- Maranoa Regional Council
- Gladstone Ports Corporation
- Australian Government Department of Environment, Water, Heritage and the Arts

General public

- Wildlife Queensland
- Port Curtis Coral Coast Aboriginal Corporation
- Callide Valley Landcare Group
- Fitzroy Basin Association
- Wildlife Preservation Society of Queensland
- World Wildlife Fund Australia
- QGC Limited
- Capricorn Conservation Council
- Fodder King
- Queensland Energy Resources Ltd
- 12 private submissions

These submissions were recorded by DIP and provided to the proponent for appropriate consideration and response. The substantive issues raised in submissions on the EIS were:

- the disposal of dredging spoil, which is the subject of a separate project – the Port of Gladstone Western Basin Dredging and Disposal Project
- the location of accommodation for construction workers for the new projects on Curtis Island
- potential impact on coastal wetlands and marine ecology from possible road, bridge and pipeline access across the Narrows
- harbour traffic generally, specific congestion issues for materials and workforce transport at Auckland Point and new port arrangements at Port Alma and Calliope River, Fishermans Landing, RG Tanna in Gladstone harbour
- transport impacts of imported gas pipes from a suitable port, and for distribution throughout the pipeline route
- pipeline corridor route, through sensitive environments, the GSDA and across the shale oil deposit at Targinie, and
- management of associated water produced from coal seam gas extraction, and its impact on soils, surface water and groundwater.

The issues listed above are discussed individually in this report. Any conditions necessary to manage the environmental impacts of the development are included in each discussion. Where applicable, the reason(s) for each condition are provided.

10.3.3 Supplementary EIS

All submissions on the EIS were forwarded to the proponent for consideration and, following discussions with the proponent and its technical consultants, the Coordinator-General determined that the preparation of a supplementary EIS (SEIS) was necessary to address substantive issues that were raised.

On 11 December 2009 the SEIS was issued to advisory agencies and other respondents to the EIS. Advisory agencies were invited to comment on the SEIS and to provide specific advice to the Coordinator-General for consideration for inclusion as conditions or recommendations in this report. Comments from advisory agencies were due by the close of business on 1 February 2010.

The SEIS was also advertised publicly on 16 December 2009, inviting submissions until close of business on 1 February 2010. A copy of the SEIS was available free of charge on the proponent's web site (and hard copies were available for purchase) and was accessible via a link on the DIP web site.

Following the six-week public review of the SEIS a total of 20 submissions were received by the Coordinator-General, consisting of 17 from advisory agencies and 3 from public and private organisations. Advisory agencies were requested to provide confirmation in writing acknowledging that their issues had been satisfactorily addressed by Santos or alternatively to provide possible recommendations and/or conditions that might allow the project to proceed.

Wherever substantive issues required technical resolution, Santos provided a written response to the SEIS submission. Any conditions necessary to manage the environmental impacts of the development are included in this report. Where applicable, the reason(s) for each condition are provided.

10.3.4 Other public information and consultation activities

The proponent conducted a public information and consultation program throughout the EIS process, as documented in Section 9 of the EIS.

Consultation included activities such as:

- targeted stakeholder briefings



- establishment and promotion of community involvement opportunities, including a 1800 free call phone number, fax number, email address and freepost service for public enquiries
- production and distribution of information about the GLNG Project including community newsletters, fact sheets, posters and flyers
- provision of field kits and information to EIS consultants and Santos land agents
- promotion and delivery of community information sessions in key locations, and
- issue specific workshops with the community.

10.4 Description of the proposed action

10.4.1 The GLNG project

The GLNG Project proponent is an unincorporated joint venture between Santos Limited and Petrolim Nasional Berhad (PETRONAS). The designated proponent for the project is Santos Limited.

Santos and PETRONAS propose to develop a LNG export facility on Curtis Island near Gladstone in Central Queensland, Australia to commercialise their Queensland natural gas resources in the Comet Ridge and Roma region.

The project involves: extraction of natural gas (also known as coal seam gas or coal bed methane) from gas fields around Roma, Emerald, Injune and Taroom; a 435 kilometre long gas transmission pipeline from the gas fields to the GLNG facility; an LNG facility on Curtis Island; and associated infrastructure including marine facilities, port dredging and a potential access road and bridge at Gladstone. The LNG will be exported to overseas markets.

The Santos Gas Fields (known as Roma, Arcadia and Fairview), located within the Surat and Bowen Basins, are proposed to be developed over a period of approximately 25 years to provide coal seam gas (CSG) to the proposed LNG Facility.

The associated Stage 1 Gas Field activities will involve development of approximately 2,650 exploration and production wells. It is anticipated that about 1,200 wells will be established prior to 2015, with potential for 1,450 or more additional wells after 2015.⁵⁷ Stage 1 Gas Field activities also include, installation of other operationally related infrastructure including access roads and tracks, in-field gas gathering networks (to transport gas from the wells to field compression stations), associated water management facilities (including brine ponds and water gathering networks), accommodation camps, offices and workshops.⁵⁸

The LNG Facility will be located in the south-west section of Curtis Island and will liquefy the gas to enable it to be transferred to ships for export. The LNG Facility is proposed to be developed in three stages. Stage 1 LNG facility activities will involve construction and operation of 1 LNG train, with a design capacity of approximately 3 - 4 Mtpa, based on a production of approximately 5 300 PJ (140 billion m³) from the gas field.⁵⁹

Santos proposes that the GLNG Facility expand to 2 trains soon after commissioning of train 1 and that a further train, bringing the total nominal capacity to 10 Mtpa, be added when market conditions are suitable.⁶⁰

I note that at this stage, the proponent is seeking approval for Gas Field development associated with supplying approximately 5 300 PJ (140 billion m³) of coal seam gas, and is not seeking, as part of this EIS

⁵⁷ Source: EIS - Executive Summary; and EIS - Section 3.2.

⁵⁸ Source: EIS - Section 3.2.

⁵⁹ Source: EIS - Executive Summary; and EIS - Section 3.2.

⁶⁰ Source: EIS - Executive Summary; and EIS - Section 3.2.

process, approvals for the additional CSG Field development and associated tenures which may be required for later stages of LNG Facility development.⁶¹

10.4.2 Gas field component

EPBC Referral 2008/4059— development of CSG resources

Proposed action

To develop coal seam as resources in the area around Roma, Emerald, Injune and Taroom in Queensland to supply feed gas for a proposed natural gas liquefaction and export park on Curtis Island near Gladstone, and as described in the referral received under the EPBC Act on 29 February 2008.

Description of the proposed action, as sourced from Referral 2008/4059

Santos Ltd is proposing to develop CSG resources in the area around Roma, Queensland to supply the feed gas for a proposed natural gas liquefaction and export park on Curtis Island, near Gladstone. Santos proposes to drill and complete enough development wells to supply approximately 5300 petajoules (PJ) (140 billion m³) CSG to the proposed natural gas liquefaction and export facility. This will likely equate to approximately 600 development wells prior to 2015 and possibly 1400 or more wells after 2015 (excluding exploration wells). **I note** that Referral 2008/4059 appears to conflict with the EIS in this regard, as the EIS proposes that about 1,200 wells will be established prior to 2015, with potential for 1,450 or more additional wells after 2015.

The development of the CSG resources is one of five components of the overall GLNG Project which also includes:

- a natural gas liquefaction and export park of up to approximately 10 million tonnes per annum (MTPA) (LNG park) on Curtis Island, near Gladstone, Queensland (the LNG park is proposed to be developed in stages, the first stage of which will be a development of up to 4 million tonnes per annum (MTPA) capacity)
- a 400+ kilometre long gas transmission pipeline corridor, which will accommodate one or more pipelines, for the delivery of the gas from the CSG resources to the LNG park
- bridge, road and services corridor to access the LNG park on Curtis Island from Gladstone
- marine facilities such as jetty, materials offloading facility
- channel dredging to service the LNG park.

Each component of the GLNG Project is a major infrastructure investment in its own right.

This referral relates to the CSG field only. The CSG field area is described as:

- Dennison Trough field including: Petroleum leases (PL's) 41 – 45, 54, 67, 173, 183 and 218; Authorities to prospect (ATP's) 337P and 553P; and Pipeline licences (PPL's) 10 and 11
- Fairview field including: PL's 90 – 92, 99, 100, 232 – 236; PPL's 76, 92 and 118; and ATP's 526P, 653P and 745P
- Roma field comprising: PL's 3 – 13, 5(K), 10W, 28, 69, 89, 93; and ATP's 336P, 631P, 655P, 665P and 708P
- Scotia field comprising PL 176 and 868P
- Mahalo field comprising ATP's 337P (part) and 804P
- Other area comprising ATP 803P.⁶²

No alternative proposed actions are provided.

⁶¹ Source: EIS, Section 3 - Project Description, p. 3.9.

⁶² Note: The original proposal was varied (on 5/8/2009) to remove Eastern Surat Basin PLs 1, 1(1) and 17, and Roma field EPC 937.



10.4.3 Gas transmission pipeline component

EPBC Referral 2008/4096—gas transmission pipeline

Proposed action

To construct a gas transmission pipeline to transport gas from a coal seam gas resource near Roma to a proposed liquefied natural gas plant on Curtis Island near Gladstone, Queensland and as described in the referral received under the EPBC Act on 13 March 2008.

Description of the proposed action, as sourced from Referral 2008/4096

Santos Ltd is proposing to develop a 400+ kilometre long gas transmission pipeline corridor, capable of delivering gas through one or more pipelines, which will deliver CSG from resources in the area around Roma, Queensland to a proposed liquefied natural gas and export park on Curtis Island, near Gladstone, Queensland.

The gas transmission pipeline and corridor are proposed as one of five components of the overall GLNG project.

Figure 1 in EPBC Referral 2008/4096 shows the indicative location of the pipeline(s) corridor route and alternative corridor.

The pipeline(s) will be underground and are expected to generally follow the route of the existing Queensland Gas Pipeline, with the exception of one major deviation. Some variations from this route may be required due to constraints such as topography, land tenure, river crossings and environmental sensitivities. The transmission corridor is anticipated to have pipelines of a nominal diameter of about 650–800 mm and be at least 400 km in overall length (length and diameter determined by eventual sources of gas resources and final pipeline alignment).

EPBC Referral 2008/4096 includes additional information relating to an alternative route along a section of the proposed alignment. The alternatives being considered are for:

- one or possibly more pipelines to provide feed gas for the LNG park
- some variations from proposed route may be required due to constraints such as topography, land tenure, river crossings and environmental sensitivities. An alternative pipeline corridor in the region of the CSG fields is included in this referral, replacing the previously submitted referral (EPBC Referral 2008/4061)
- the pipeline crossing options for Port Curtis including horizontal directional drilling, laying the pipe on the seabed, in a trench under the seabed, or suspended above water on the proposed bridge adjoining Curtis Island to the mainland.

10.4.4 LNG facility component

EPBC Referral 2008/4057— LNG facility

Proposed action

Development of a proposed natural gas liquefaction and export park on Curtis Island, near Gladstone, Queensland, and as described in the referral received under the EPBC Act on 28 February 2008.

Description of the proposed action, as sourced from Referral 2008/4057

The LNG facility is proposed to be located on Curtis Island within a 5 km radius of the Hamilton Point area, situated approximately 5 km north-east of the City of Gladstone, and occupying a footprint of up to approximately 200 ha. Figure 2 in Referral 2008/4057 shows the indicative location of the LNG facility.

The LNG facility is proposed as one of five components of the overall GLNG project.

It is proposed that the first stage production (of up to 4 Mtpa of LNG) will commence operation in early 2014 and have an expected operational life in excess of 20 years. Additional stages taking the capacity of the LNG facility up to 10 Mtpa are proposed to commence once CSG resources have been verified.

The major LNG facility components may include, but are not limited to:

- inlet separation / filtration / treatment to remove pipeline debris and liquids
- gas treatment to remove substances within the gas stream that are detrimental in the process of liquefaction of natural gas, including carbon dioxide, water and other contaminants
- refrigeration and liquefaction to liquefy the natural gas
- LNG storage tank(s) with vapour recovery
- supporting facilities (eg. construction accommodation)

Construction of the first stage was proposed to commence in about early 2010 with construction period of approximately four years.

Alternatives sites were examined as part of siting studies in the region (between Townsville and Brisbane), including Fisherman's Landing; Wiggins Island; South Trees Point; Boatshed Point, Curtis Island; North China Bay, Curtis Island; Hamilton Point, Curtis Island; and Hamilton Point West, Curtis Island. Fisherman's Landing, Wiggins Island, South Trees Point and Boatshed Point did not meet the key selection feasibility criteria. Hamilton Point, Hamilton Point West and North China Bay (all on Curtis Island) proved to be feasible from a technical, environmental and safety standpoint, however with different development cost and operating cost outcomes for each site.

10.4.5 Other components

EPBC Referral 2008/4058—Marine facilities

Proposed action

Development of marine facilities (such as a jetty, materials offloading facility and channel dredging) to service a proposed natural gas liquefaction and export park on Curtis Island, near Gladstone, Queensland, and as described in the referral received under the EPBC Act on 28 February 2008.

Description of the proposed action, as sourced from Referral 2008/4058

The marine facilities are proposed to be located near Curtis Island (around the Hamilton Point area), near Gladstone. Figure 2 in EPBC Referral 2008/4058 shows the indicative location of the marine facilities.

The marine facilities are proposed as one of five components of the overall GLNG project.

The marine facilities are proposed to be in place to support the first stage (4 Mtpa) of the LNG facility by early 2014 and are proposed to have an expected operational life in excess of 20 years.

Subsequent stages of the LNG facility will see an increase in production to the ultimate capacity of 10 Mtpa and further development of the marine facilities (e.g. additional berths) is proposed be constructed on the jetty.

No alternative proposed actions are provided.

EPBC Referral 2008/4060— Bridge, Road and Services corridor

Proposed action

Construct a bridge from the mainland near Gladstone, Queensland across to Curtis Island with connecting roads on either side, connect the proposed LNG park on Curtis Island (around the Hamilton Point area) with the existing Landing Road, near Gladstone, Queensland, and as described in the referral received under the EPBC Act on 28 February 2008.

Description of the proposed action, as sourced from Referral 2008/4060

Santos is proposing to develop a bridge and road to access a proposed natural gas liquefaction and export park on Curtis Island, near Gladstone.

The bridge and road are proposed as one of five components of the overall GLNG project.

The road and bridge are proposed to connect the proposed LNG facility on Curtis Island (around the Hamilton Point area) with the existing Landing Road, near Gladstone in Central Queensland. The bridge



will be located south of the Mackay/Capricorn Marine Park. Figure 2 in EPBC Referral 2008/4060 shows the indicative location of the bridge and road.

The road will be approximately 14 km long and will require an area of approximately 50 m wide for construction (i.e. approximately 70 ha). The bridge is proposed to be approximately 1.5 km long and require an area of approximately 100 m wide for construction (i.e. approximately 15 ha).

The proponent indicates that variations to this route may be required in some places dependent on topography, land tenure and environmental sensitivities (Note: the bridge is proposed to be located south of the Mackay/Capricorn Marine Park).

No alternative proposed actions are provided.

10.5 Places affected by the project

10.4.6 Gas field component

Petroleum tenure

I note that the EIS and Referral states that the proponent is seeking approval for Gas Field development to support the first stage of the GLNG facility only, i.e. development wells to supply approximately 5300 petajoules (PJ) (140 billion m³) of CSG, producing approximately 3-5 Mtpa of LNG.

I note that the EIS states that the associated Gas Field disturbances are proposed to occur on petroleum tenements within the reasonably foreseeable development area (RFDA), as nominated by the proponent in Section 3.4.2 of the EIS. The specified petroleum tenements are: petroleum leases (PLs) 3-9, 13, 90-92, 93, 99-100, 232-236, 250, 251, 281 and 282; authorities to prospect (ATPs) 336 (part), 526P and 653P; and pipeline licences (PPLs) 76 and 92.⁶³ The table below provides a summary the RFDA petroleum tenements assessed for the Gas Field.

Table 10.1 – RFDA Petroleum Tenements

Development area	Area (km ²)	Petroleum tenures		
		Petroleum leases (Gas Field)	Authorities to prospect (Gas Field)	Pipeline licences (Gas Field)
Reasonably Foreseeable Development Area (i.e. for GLNG train 1)	6,887	PLs 232-236 (Fairview)	ATPs 526P and 653P (Fairview)	
		PLs 90-92 and 99-100 (Fairview)	ATPs 526P and 653P (Fairview)	PPLs 76 and 92 (Fairview)
		PLs 3-9 (Roma), 13 (Roma), 93 (Roma), 250 ¹ , 251 ¹ , 281 ¹ , 282 ¹	ATP 336 [Part] (Roma)	

¹Under application at the time of EIS preparation

Therefore, I note that the proponent's EIS assessment of environmental impacts for the Gas Field is limited to disturbances on the (abovementioned) RFDA petroleum tenements only. **Further I confirm** that with regard to the Gas Field component of the GLNG project, **my evaluation report** is hence limited to an evaluation of impacts on these RFDA petroleum tenements only.

However, I note that the corresponding EPBC Referral (2008/4059) includes a greater CSG field area than the RFDA and nominates additional petroleum tenements that are outside of the RFDA. The greater

⁶³ Refer to EIS Section 3, Section 3.4.2 and Table 3.4.1.

CSG field area (comprising Arcadia Valley, Fairview, Mahalo, Comet, Roma, Roma Other, Denison Trough and Scotia fields) covers approximately 22 million ha.

I confirm that impacts on petroleum tenements outside of the RFDA have **not** been assessed. Hence I confirm the following tenements nominated in EPBC Referral 2008/4059 have **not** been assessed as part of the EIS process for the GLNG project under the SDPWO Act:

- Petroleum leases 10-12 (Roma), 28 (Roma), 41- 45 (Denison Trough), 54 (Denison Trough), 67 (Denison Trough), 69 (Roma), 89 (Roma), 173 (Denison Trough), 176 (Scotia), 183 (Denison Trough), 218 (Denison Trough)
- Authorities to prospect 336 [Part] (Roma), 337P (Mahalo), 553P (Denison Trough), 631P (Roma), 655P (Roma), 665P (Roma), 708P (Roma), 745P (Fairview), 803P (Other), 804P (Mahalo), 868P (Scotia), and
- Pipeline licences 10-11 (Denison Trough), PPL 118 (Fairview).

Local Authority Areas

The proposed Gas Fields will be within the following local authority areas: Roma Regional Council, Dalby Regional Council, Banana Shire Council and Central Highlands Regional Council.

The towns of Rolleston, Injune, Roma, Taroom and Wallumbilla are nearby towns to the Gas Fields.

Land Tenure

Details regarding real property descriptions within the Gas Fields are provided within EIS Appendix I. Freehold land comprises 56.5 per cent of the Gas Field area, with the balance being leasehold 26.5 per cent, state forest 9 per cent, National Park 4 per cent, easements 2.5 per cent, state land 1 per cent, and reserves 0.5 per cent.

Places of Conservation Significance

National environmental significance

Features of national and state environmental significance are provided in EIS, Section 6.11 and Appendix N1 - *Nature Conservation - CSG Field*.

National Park conservation areas⁶⁴ within GLNG project Gas Field tenements and within a 5km buffer of Gas Field tenements are as follows:

Table 10.2 – National Parks near Gas Field Tenements

Within the Gas Field petroleum tenements	Within 5km of Gas Field petroleum tenements
National Parks	
Expedition National Park	Blackdown Tableland National Park
Carnarvon National Park	Southwood National Park
Carraba Conservation Park	
Lake Murphy Conservation Park	
Nuga Nuga National Park	
Palmgrove National Park (Scientific)	

⁶⁴ Note: National Park areas are not protected under the EPBC Act as MNES.



Land Use

The Gas Field area is predominantly used for agriculture. Cattle grazing is the most visible agricultural use in the eastern portion; towards Roma there is an increasing proportion of crop production, particularly wheat.

Good Quality Agricultural Land (GQAL) coverage (Class A - Cropping land, B - Limited cropping land and C - Pasture land) within the GLNG project's Gas Fields are provided in EIS Table 6.1.1, as follows.

Table 10.3 – Good Quality Agricultural Land within Gas field Tenements

Gas Field	GQAL Coverage
Roma	Class A: 48.2 per cent Class B: 33.45 per cent (Taroom), 0.55 per cent (Other areas) Class C: 17.16 per cent (Taroom), 42.56 per cent (Other areas)
Fairview	Class A: 1.50 per cent Class B: 5.57 per cent Class C: 92.93 per cent
Arcadia Valley	Class A: 8.45 per cent Class B: 1.02 per cent Class C: 55.70 per cent

There are numerous stock routes traversing the area. The stock route is used predominantly for moving stock to market (to the Roma Saleyards).

10.5.1 Gas transmission pipeline component

The proposed 435km gas transmission pipeline commences south of the Fairview Gas Field and runs approximately 140km north before turning and running approximately 280km eastward to Friend Point in the Gladstone State Development Area, before continuing eastward across The Narrows marine waters to the western side of Curtis Island. The pipeline then turns and travels south, ending at the proposed GLNG site on the south-west corner of Curtis Island.

Thus, for environmental impact assessment purposes, the transmission pipeline impacts have been broken into three (3) components dealing with the: mainland; marine; and Curtis Island environs.

A Common Pipeline Infrastructure Corridor (CPIC) between Callide and proposed LNG facility sites on Curtis Island has been proposed by the Queensland Government to cater for multiple gas transmission pipelines for multiple LNG proponents. The EIS provided an impact assessment for the CPIP transmission pipeline route, in addition to the impact assessment for the GNLG pipeline route. **I note** that the proponent has stated that the CPIP route is the proponent's preferred option, and **I have conditioned** the pipeline to be located in this common infrastructure corridor (Appendix 3, Part 1, Condition1).

I note the EIS proposed that the gas transmission pipeline right of way (ROW) will be 30 m wide on the mainland and 100 m wide on Curtis Island.⁶⁵ Based on these ROW widths, a total of approximately 258.2 ha of remnant vegetation is to be removed (comprising approx. 188.6 ha of remnant vegetation on the mainland, and approx. 69.6 ha of remnant vegetation on Curtis Island). **I note** the EIS reports that the clearing of remnant vegetation within the ROW will provide the greatest impacts to flora and fauna.⁶⁶

However, I note that the SEIS proposes a higher ROW width of disturbance/clearing (hence resulting in a higher area of disturbance and increased impacts on flora, fauna and ecological communities) due to

⁶⁵ Refer to EIS N2 – Gas Transmission Pipeline (Fauna), Executive Summary, p. ES-1.

⁶⁶ Refer to EIS N2 – Gas Transmission Pipeline (Fauna), Executive Summary, p. ES-1.

the large diameter of the pipeline (42 inches in diameter) and associated physical construction constraints: the SEIS proposes a maximum 40 m width for the ROW (except for in Environmentally Sensitive Areas – where a 30 m width ROW is proposed).⁶⁷ **I note** that DERM draft environmental authority conditions allow a 40 m wide ROW, however any vegetation clearing in an endangered/of concern RE or associated buffer zone must not exceed a 30 m width for pipeline construction purposes. **I am aware** that further impact reductions can be readily achieved by locating pipeline lay-down and truck-turning areas on previously cleared land and existing roads to avoid additional disturbance to soils, vegetation and waters. **Therefore I consider** a 40m wide ROW (reducing to 30 m wide in environmentally sensitive areas) to be a reasonable level of disturbance for the construction of the pipeline, given the diameter of the pipeline and physical construction constraints.

I note that the Bridge, Road and Service corridor are no longer being pursued by the proponent as a component of the GLNG project, **hence I note** that there is no longer a need for a 100m ROW on Curtis Island (to cater for the previously proposed road and services). **Therefore I find** that the width of disturbance for construction of the ROW on Curtis Island should revert to the width of disturbance allowed for construction of the ROW on the mainland.

I note that the proposed 435km gas transmission pipeline will be buried, hence, following completion of construction phase, there will be no significant physical presence of the pipeline itself on the landscape surface to interfere with the use of the land that it traverses.

Local Authority Areas

The pipeline corridor will be within the following local authority areas: Roma Regional Council, Central Highlands Regional Council, Banana Shire Council, Dalby Regional Council and Gladstone Regional Council.

Land Tenure

Details of the real property descriptions that are crossed by the proposed pipeline corridor are provided in EIS Appendix I. A detailed breakdown of land tenure along the corridor is provided in EIS Appendix V – Land Use and Project Approvals.

Freehold land comprises 67 per cent of the gas transmission pipeline corridor, with the balance being leasehold. State forest comprises 2 per cent, state land 3 per cent and easements comprise 4.5 per cent.

Places of Conservation Significance

International environmental significance

The EIS reports that the proposed marine pipeline crossing is within the Great Barrier Reef World Heritage Area (GBRWHA)⁶⁸, as the pipeline is proposed to cross The Narrows and onto Curtis Island.

The GBRWHA extends approx. 2000 kilometres along the Queensland coast. On the western side of Curtis Island, the GBRWHA stretches along The Narrows south to Graham Creek, approximately six kilometres north of the GLNG study area.

National environmental significance

Features of national environmental significance are provided in EIS, Section 7.11.

National Park conservation areas⁶⁹ within the gas transmission pipeline buffer and within 5km of the gas transmission pipeline buffer are as follows:

⁶⁷ Refer to SEIS, Attachment E – Gas Transmission Pipeline - E1, Section 1.1.

⁶⁸ Included on the World Heritage List

⁶⁹ Note: National Park areas are not protected under the EPBC Act as MNES.



Table 10.4 – National Parks near Gas Pipeline

National Parks	
Within the gas transmission pipeline buffer	Within 5km the gas transmission pipeline buffer
Expedition National Park Great Barrier Reef Coast Marine Park	Curtis Island National Park Nuga Nuga National Park

Also, Port Curtis, south of the entrance to 'The Narrows' is listed in the Directory of Important Wetlands in Australia. This area has been identified for its extensive range of marine wetlands encompassing seagrass beds, mangrove forest and intertidal mud flats that provide habitat for a range of significant migratory water birds, reptiles and mammals.⁷⁰

10.5.2 LNG facility component

The LNG facility site is proposed to be located on a 190 ha area in the south-west corner of Curtis Island, near Gladstone. Curtis Island is approximately 40km long and 20km wide.

The Materials Off-loading Facilities (MOF) and Product Loading Facilities (PLF) sites will be located in Port Curtis and will include construction on intertidal land.

Local Authority Areas

The LNG facility site on Curtis Island is within the Gladstone Regional Council local authority area. However, the LNG facility site planning aspects are removed from local authority and replaced by the development scheme for the Curtis Island Industry Precinct (CIIP) component of the Gladstone State Development Area.

The development scheme for the Gladstone State Development Area is a land use planning instrument, approved by the Governor-in-Council in 2000. The CIIP was added to the GSDA in July 2008 to provide for the establishment of LNG facilities on the west coast of southern Curtis Island.

Land Tenure

The LNG facility site is on freehold land partly owned by the proponent and partly owned by the State of Queensland as follows: Lot 7 on DS220 (State of Queensland), Lot 9 on DS220 (proponent), Lot 10 on DS220 (State of Queensland).

Places of Conservation Significance

International environmental significance

World Heritage Areas

The GBRWHA⁷¹ extends approximately 2000 kilometres along the Queensland coast. On the western side of Curtis Island, the GBRWHA stretches along The Narrows south to Graham Creek, approximately six kilometres north of the GLNG study area.

Internationally Important wetlands

Ramsar wetlands are included on the List of Wetlands of International Importance developed under the Ramsar Convention (on Wetlands); an intergovernmental treaty signed in Ramsar, Iran, in 1971. There are no Ramsar-listed wetlands on or near Curtis Island.

National environmental significance

Features of national environmental significance are provided in EIS, Section 8.11.

Conservation areas in proximity to the LNG facility site are as follows:

⁷⁰ Source: EPBC Referral 2008/2096.

⁷¹ Included on the World Heritage List

Table 10.5 – National Parks near LNG Facility

Conservation areas	Location
National Park/Conservation Areas	
Garden Island Conservation Park	2km east of LNG facility site
Curtis Island National Park	5km north of LNG facility site

Table 10.6 – Marine Parks near LNG Facility

Marine Park	
Great Barrier Reef Marine Park	On eastern side of Curtis Island
Great Barrier Reef Coast Marine Park	The Narrows

Also, Port Curtis, south of the entrance to 'The Narrows' is listed in the Directory of Important Wetlands in Australia. This area has been identified for its extensive range of marine wetlands encompassing seagrass beds, mangrove forest and intertidal mud flats that provide habitat for a range of significant migratory water birds, reptiles and mammals.⁷²

Cultural heritage conservation significance

Features of indigenous and non-indigenous cultural heritage significance are addressed in the cultural heritage section of this report.

Cultural Heritage

Indigenous Cultural Heritage

There were no sites of indigenous cultural heritage identified on Curtis Island in the vicinity of the LNG facility through desktop searches undertaken by the proponent.

Cultural heritage surveys are currently underway and should identify areas and sites of cultural significance that are found to occur within the project area. The *Aboriginal Cultural Heritage Act 2003* (Qld) sets out provisions for determining cultural significance. **I am satisfied** that impacts to these areas will be mitigated and managed in accordance with the *Aboriginal Cultural Heritage Act 2003* and with the Cultural Heritage Management Plan (CHMP) agreed with the Port Curtis Coral Coast Traditional Owner group.

Non-Indigenous Cultural Heritage

There were no sites of non-indigenous heritage identified in any of the world, state or local registers searched for the LNG facility study area.

Heritage sites identified during field surveys were not considered to be of state significance. State significant sites are protected by the *Queensland Heritage Act 1992*. **I am satisfied** that should sites of State Significance be located in future, any work needing to be conducted by the proponent will be undertaken in accordance with the *Queensland Heritage Act 1992*

There were no Heritage Precincts identified nearby the LNG facility study area.

Three places of local historical interest were identified. Two of these will not be directly impacted by project activities. **I am satisfied** that impacts to these places of local historical interest, and any other locally significant sites or heritage precincts, will be mitigated and managed in accordance with the Environmental Management Plan for the LNG facility and as per the Burra Charter (Marquis-Kyle and Walker 1999).

⁷² Source: EPBC Referral 2008/2096.



I note that the proponent has committed that cultural heritage surveys will be conducted prior to any construction activities commencing in the vicinity of any identified or potential cultural heritage sites.

I note that the proponent has committed to avoiding, protecting and managing all heritage sites and places as per the Burra Charter (Marquis-Kyle and Walker 1999), and educating all staff and contractors on the location and significance of the sites to avoid disturbance.

Land Use

The LNG facility site and surrounds are currently used for grazing cattle purposes.

10.6 The proponent's assessment of MNES

The proponent's assessment of MNES is located in various sections of the EIS and SEIS as outlined below.

10.6.1 Gas field

The proponent's EIS and SEIS assessment the project's Gas Field component on MNES is presented in:

- EIS, Section 6.4, *CSG Field Environmental Values and Management of Impacts - Nature Conservation*⁷³
- EIS, Appendix G - *EPBC Controlled Action Assessment Report*, Section 4: *Development of CSG Resources - EPBC 2008/4059*⁷⁴
- EIS, Appendix N1 - *Nature Conservation - CSG Field*⁷⁵
- EIS, Appendix N4 - *Aquatic Flora and Fauna*⁷⁶, and
- SEIS, Attachment D5 - *Nature Conservation*.⁷⁷

10.6.2 Gas transmission pipeline

The proponent's EIS and SEIS assessment the project's Transmission Pipeline component on MNES is presented in:

- EIS, Section 7.4, *Gas Transmission Pipeline Environmental Values and Management of Impacts - Nature Conservation*⁷⁸
- EIS, Appendix G - *EPBC Controlled Action Assessment Report*
- EIS, Appendix N2 - *Gas Transmission Pipeline (Flora)*⁷⁹
- EIS, Appendix N2 - *Gas Transmission Pipeline (Fauna)*⁸⁰

⁷³ Link to document:

<http://www.glng.com.au/library/EIS/Section%206/06%2004%20Nature%20Conservation%20%28Section%206.4%29%20FINAL%20PUBLIC.pdf>

⁷⁴ Link to document: http://www.glng.com.au/library/EIS/Appendices/G_EPBC%20Report%20FINAL%20PUBLIC.pdf

⁷⁵ Link to document: http://www.glng.com.au/library/EIS/Appendices/N1_Nature%20Conservation%20CSG%20Field%20FINAL%20PUBLIC.pdf

⁷⁶ Link to document:

http://www.glng.com.au/library/EIS/Appendices/N4_Aquatic%20Flora%20and%20Fauna%20FINAL%20PUBLIC.pdf

⁷⁷ Link to document: http://www.glng.com.au/library/Part_3_D5_Nature_Consevation.pdf

⁷⁸ Link to document: <http://www.glng.com.au/Content.aspx?p=90>

⁷⁹ Link to document:

http://www.glng.com.au/library/EIS/Appendices/N2_Nature%20Conservation%20Gas%20Transmission%20Pipeline%20Flora%20Pipeline%20FINAL%20PUBLIC.pdf

- SEIS, Attachment E3 - Nature Conservation.⁸¹

10.6.3 LNG facility

The proponent's EIS and SEIS assessment the project's LNG Facility component on matters of NES is presented in:

- EIS, Section 8.4, LNG Facility *Environmental Values and Management of Impacts - Nature Conservation*⁸²
- EIS, Appendix G - *EPBC Controlled Action Assessment Report*, Section 2.
- EIS, Appendix N3 - *LNG Facility (Flora)*⁸³
- EIS, Appendix N3 - *LNG Facility (Fauna)*⁸⁴, and
- SEIS, Attachment F – LNG Facility, F2 - *Nature Conservation*.⁸⁵

10.7 Assessment of potential impacts and mitigation measures in relation to the controlling provisions

The following sections assess the potential impacts and proposed mitigation measures for each component of the GLNG Project in relation to the applicable controlling provisions. The applicable controlling provisions for the GLNG Project are as follows:

World Heritage properties (EPBC Act sections 12 and 15A)

Approval of activities with a potential for significant impact on a declared World Heritage property is provided for under section 12 of the EPBC Act.

World Heritage properties are sites that are recognised under the World Heritage Convention as being of international significance because of their outstanding natural and/or cultural values. A full list of Australian places on the World Heritage List is provided on the DEWHA web site.⁸⁶

National Heritage places (EPBC Act sections 15B and 15C)

Approval of activities with a potential for significant impact on a National Heritage place is provided for under section 15B of the EPBC Act.

The National Heritage places are sites with outstanding natural, Indigenous or historic heritage value to Australia. A full list of National Heritage places can be found on the National Heritage List provided on the DEWHA web site.⁸⁷

Listed threatened species and communities (EPBC Act sections 18 and 18A)

⁸⁰ Link to document:

http://www.glng.com.au/library/EIS/Appendices/N2_Nature%20Conservation%20Gas%20Transmission%20Pipeline%20Fauna%20FINAL%20PUBLIC.pdf

⁸¹ Link to document: http://www.glng.com.au/library/Part_3_E3_Nature_Consevation.pdf

⁸² Link to document:

<http://www.glng.com.au/library/EIS/Section%208/08%2004%20Nature%20Conservation%20%28Section%208.4%29%20FINAL%20PUBLIC.pdf>

⁸³ Link to document:

<http://www.glng.com.au/library/EIS/Appendices/N3%20Nature%20Conservation%20LNG%20Facility%20Fauna%20FINAL%20PUBLIC.pdf>

⁸⁴ Link to document:

<http://www.glng.com.au/library/EIS/Appendices/N3%20Nature%20Conservation%20LNG%20Facility%20Fauna%20FINAL%20PUBLIC.pdf>

⁸⁵ Link to document: http://www.glng.com.au/library/Part_3_F2_Nature_Consevation.pdf

⁸⁶ Link to <http://www.environment.gov.au/heritage/places/world/list.html>

⁸⁷ Link to National Heritage List: <http://www.environment.gov.au/heritage/places/national/index.html>



Approval of actions with a potential for significant impact on listed threatened species or endangered communities is provided for under section 18 of the EPBC Act.

EPBC threatened species (for the purposes of protected matters of NES) include: species that are extinct in the wild; critically endangered species; endangered species; and vulnerable species. Full listings of EPBC threatened flora and fauna species can be found on the DEWHA web site.^{88 and 89}

Threatened ecological communities are categorised as: critically endangered; endangered; and vulnerable communities. A full list of EPBC threatened ecological communities can be found on the DEWHA web site.⁹⁰ Endangered communities include critically endangered and endangered communities.

Schedule 3 of the *Nature Conservation Act 1992* and Queensland Nature Conservation (Wildlife) Regulation 1994 (QNCW Reg) lists all Queensland's vulnerable wildlife.

Listed migratory species (EPBC Act sections 20 and 20A)

Approval of activities with a potential for significant impact on a listed migratory species is provided for under section 20 of the EPBC Act.

Migratory species are animal species that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. Listed migratory species are listed in the: *Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)*; *China-Australia Migratory Bird Agreement (CAMBA)*; *Japan-Australia Migratory Bird Agreement (JAMBA)*. Listed migratory species also include any native species identified in an international agreement approved by the Australian Minister responsible for administering the EPBC Act.

A full list of EPBC migratory species can be found on the DEWHA web site.⁹¹

10.7.1 Gas field

The proponent's assessment of potential impacts and mitigation measures is provided in Section 4 of EIS Appendix G - *EPBC Controlled Action Assessment Report* and SEIS, Attachment D5 - *Nature Conservation*.

I note that the SEIS has calculated vegetation clearing in the project Gas Fields based on a forecasted Field Development Plan (FDP) for the Gas Field reasonable foreseeable development area (RFDA) only. The RFDA is within the Arcadia valley, Fairview and Roma gas fields and covers approximately 1.3 million ha.

I note that the FDP has not been provided as part of the EIS, hence the locations of proposed wells, pipelines and associated infrastructure have not been provided and are **hence unknown to me** at the time of writing of this report. **I also note** that it is the proponent's intention that the FDP will change incrementally over the life of the project.⁹²

I note that the proponent's impact assessment methodology for the FDP area has involved:

- an environmental constraints-based mapping and approach (i.e. overlaying the forecasted FDP on constraints maps and applying a field management protocol). The environmental constraints classifications and the environmental constraints-based mapping and approach are outlined in SEIS Attachment D5 – *Nature Conservation* (refer to Part 2 - *Environmental Constraints Mapping and Field Management Protocols*), and

⁸⁸ Link to EPBC threatened flora species:

<http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora>

⁸⁹ Link to list of EPBC threatened fauna species:

<http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=faua>

⁹⁰ Link to list of EPBC threatened ecological communities:

<http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>

⁹¹ Link to EPBC migratory species: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowmigratory.pl>

⁹² SEIS, Attachment D5 - *Nature Conservation*.

- estimating the extent of potential effects (due to vegetation clearing) on the ecological values of the FDP component of the Gas Field RFDA based on three different well-location scenarios, representing: worst case 'Pre-Avoidance and Mitigation' scenario (one well hole per drill pad i.e. highest impact); most likely 'Reasonable Worst-Case' scenario (multiple drill holes from one drill pad i.e. medium impact); and best case 'Reasonable Best-Case' scenario (multiple drill holes from one drill pad, plus impact avoidance using field management protocols i.e. lowest impact) scenarios.

Listed threatened species and communities (EPBC Act section 18 and 18A)

Threatened ecological communities

The EIS reports that database searches identified five (5) threatened ecological communities listed under the EPBC Act as potentially occurring within the greater gas field (i.e. comprising Arcadia Valley, Fairview, Mahalo, Comet, Roma, Roma Other, Denison Trough and Scotia gas fields, and covering approx 22 million ha).

Field surveys within the RFDA (i.e. comprising the Arcadia valley, Fairview and Roma gas fields, and covering approx.1.3 million ha) between September and November 2008, identified the following threatened ecological communities:

- brigalow ecological community (*Acacia harpophylla* dominant and codominant)
- semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin; and
- the community of native species dependant on natural discharge of groundwater from the Great Artesian Basin.

I note that the SEIS assesses the potential direct impacts on EPBC listed communities in the FDP component of the gas field RFDA only.⁹³ **Further, I note** that the total area covering the FDP component is not stated, and **similarly I note** that the total area of land and vegetation disturbance forming the basis of estimates for direct impacts on listed communities within the FDP area has not been provided.

I understand that the ultimate area of the FDP is dependent on gas yield of the wells both as a rate of production and their longevity, hence notional areas have been used. However, **I reiterate** that those notional areas of land disturbance, forming the basis of estimates for direct impacts on listed communities within the FDP area, have not been provided.

I note that areas of impact are based on wells, pipelines, roads and compressors; **however I note** that it is unclear whether water storages, water treatment infrastructure and irrigation areas have been included, nor what areas of disturbance have been assumed for these infrastructure items and activities.⁹⁴ **I note** that the proponent has subsequently advised that water storages were included as part of compressor station areas, **nevertheless I note** that the total area of land disturbance associated with these activities is not presented.

I also note that the proponent's estimate of potential impacts to threatened ecological communities as a percentage (per cent) of the bioregional extent of those communities is based on the proponent's 'Reasonable worst-case' well-location scenario (multiple drill holes from one drill pad).

Based on the 'Reasonable worst-case' well-location scenario, the proponent has estimated that areas of potential impact on EPBC listed communities in the FDP component of the gas field RFDA will be negligible.⁹⁵ However, for comparison purposes, a summary of the potential impacts on EPBC listed communities in the FDP component of the gas field RFDA, based on the proponent's worst case 'Pre-Avoidance and Mitigation' well-location scenario (i.e. one well hole per drill pad), is presented on the

⁹³ Refer to Tables 2.7, 2.8 and 2.12 in SEIS Attachment - D5 – *Nature Conservation*.

⁹⁴ Infrastructure elements on Tables 2.11 and 2.13 in SEIS Attachment - D5 – *Nature Conservation* refer to pipelines, roads and compressors only.

⁹⁵ Refer to Tables 2.7, 2.8 and 2.12 in SEIS Attachment - D5 – *Nature Conservation*.



table⁹⁶ below. The estimate is based on proponent's constraints-based mapping methodology as outlined above.

Table 10.7 - Potential impacts on EPBC listed communities in the FDP component of the gas field

Ecological communities	Description	EPBC Act status	Area within Bio-region (ha)	Area of Impact (ha)			per cent of Bio-regional Extent
				Wells – High Impact 'Pre-Avoidance and Mitigation' scenario	Other infrastructure elements ⁹⁷	Total (FDP area only)	
Brigalow ecological community	Brigalow (<i>Acacia harpophylla</i> dominant and codominant) ecological communities	Endangered	246,230	32.4	19.6	52	0.0211
Semi-Evergreen Vine Thicket	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	33,883	68.4	0.8	69.2	0.2042
Bluegrass ecological community	Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	160,830	2.4	5.2	7.6	0.0047
Total			440,943	103.2	25.6	128.8	0.23

I note proposed mitigation measures are provided in: EIS, Section 6.4, *CSG Field Environmental Values and Management of Impacts - Nature Conservation*⁹⁸; EIS, Appendix N1 - *Nature Conservation - CSG Field*⁹⁹; and EIS, Appendix N4 - *Aquatic Flora and Fauna*.¹⁰⁰

⁹⁶ Note: Information presented here is adapted from information provided in Tables 2.7, 2.8 and 2.12 in SEIS Attachment - D5 – *Nature Conservation*.

⁹⁷ Pipelines, roads and compressors.

⁹⁸ Link to document:

<http://www.glng.com.au/library/EIS/Section%206/06%2004%20Nature%20Conservation%20%28Section%206.4%29%20FINAL%20PUBLIC.pdf>

⁹⁹ Link to document:

http://www.glng.com.au/library/EIS/Appendices/N1_Nature%20Conservation%20CSG%20Field%20FINAL%20PUBLIC.pdf

¹⁰⁰ Link to document:

http://www.glng.com.au/library/EIS/Appendices/N4_Aquatic%20Flora%20and%20Fauna%20FINAL%20PUBLIC.pdf

Threatened species

The EIS reports that database searches identified seventy (70) EPBC listed threatened species as potentially occurring within the greater gas field (i.e. comprising Arcadia Valley, Fairview, Mahalo, Comet, Roma, Roma Other, Denison Trough and Scotia gas fields, and covering approx 22 million ha).

The EIS also reports that field surveys within the RFDA (i.e. comprising the Arcadia valley, Fairview and Roma gas fields, and covering approx. 1.3 million ha), between September and November 2008, identified one EPBC listed species (the squatter pigeon, *Geophaps scripta scripta*) and suitable habitat for a number of EPBC listed fauna and flora species, including three (3) mammals, five (5) birds, five (5) reptiles and eleven (11) plant species. **I note** that the gas field survey effort appears minimal, and **I consider** that field surveys conducted over this extensive area over time, incorporating all seasons, would likely result in identification of a greater diversity of species.

EPBC listed fauna species – Direct impacts to individual species

I note that the SEIS assess the potential fauna habitat for EPBC listed species likely to be directly impacted within the FDP component of the gas field RFDA only.¹⁰¹ **I note** that areas of impact are based on wells, pipelines, roads and compressors, however, it is not clear whether water storages and water treatment infrastructure and irrigation areas have been included, nor what areas of disturbance have been assumed for these infrastructure items and activities.¹⁰² **I note** that the proponent has subsequently advised that water storages were included as part of compressor station areas and was included in calculation of disturbance of listed species and communities. Nevertheless, **I note** that the total area of land disturbance associated with these activities is not presented.

I note that the total area of land and vegetation disturbance associated with these impact estimates (i.e. the total area of disturbance for the FDP) is not stated. As previously stated, **I understand** that the ultimate area of the FDP is dependent on gas yield of the wells both as a rate of production and their longevity, hence notional areas have been used. However, those notional areas of land disturbance, forming the basis of estimates for direct impacts on listed species within the FDP area, have not been provided.

The potential impacts on EPBC listed fauna habitat areas in the FDP component of the gas field RFDA, based on the proponent's worst case 'Pre-Avoidance and Mitigation' well-location scenario (i.e. one well hole per drill pad), is summarised on the table¹⁰³ below. The estimate is based on proponent's constraints-based mapping methodology as outlined above.

Table 10.8 – EPBC Fauna Habitat Areas in Gas Fields

EPBC listed species potentially present	Habitat and range	EPBC Act Status	Area of Impact (ha)		
			Wells – High Impact 'Pre-Avoidance and Mitigation' scenario	Other infrastructure elements ¹⁰⁴	Total (FDP area only)
Mammals					
<i>Dasyurus hallucatus</i> northern quoll	Has declined dramatically from region primarily due to cane toad. Any remaining populations would probably occur in <10 per cent of available habitat.	Endangered	535.2	356.8	892

¹⁰¹ Refer to Tables 2.5 and 2.6 in SEIS Attachment - D5 – *Nature Conservation*.

¹⁰² Infrastructure elements on Tables 2.6 and 2.8 in SEIS Attachment - D5 – *Nature Conservation* refer to pipelines, roads and compressors only.

¹⁰³ Note: Information presented is adapted from information presented in Tables 2.5 and 2.6 in SEIS Attachment - D5 – *Nature Conservation*.

¹⁰⁴ Pipelines, roads and compressors.



<i>Chalinolobus dwyeri</i> large-eared pied bat, large pied bat	Not known to occur in study area away from landzone 10. Will forage in adjoining woodlands as well as clearings. Known from the Expedition Range; likely to be widespread but low in numbers	Vulnerable	498	381.6	879.6
<i>Nyctophilus timoriensis</i> eastern long-eared bat (South-eastern form)	Occurs in wide range of remnant woodland types but in very low numbers. Recently recorded from Lonesome Holding in southern Arcadia Valley; also known from Carnarvon Range through to Moonie area (e.g. Alton National Park). May also occur on adjoining non-remnant depending on unmappable micro site features (i.e. availability of hollows).	Vulnerable	800.4	729.7	1530.1
Birds					
<i>Geophaps scripta scripta</i> squatter pigeon (southern)	Throughout northern area in most vegetation except the densest types (e.g. brigalow/vine thicket). Occurrence usually dependant on water, especially in non-remnant areas. Will also live in high disturbed sites close to water (e.g. cattle yards). Virtually absent south of Injune except for small population in Yuleba State Forest.	Vulnerable	542.4	510.30	1050.3
<i>Erythrotriorchis radiatus</i> Red goshawk	Could potentially overfly anywhere in all of northern gas fields including non-remnant. Focus areas most likely to be around Lake Nuga Nuga and Palm Tree / Robinson Creek wetlands.	Vulnerable	540	510.30	1050.3
<i>Turnix melanogaster</i> Black-breasted button-quail	Known from RE 11.9.4 immediately adjoining the Comet CSG field. Greater than 90 per cent probability in largest RE 11.9.4 patches in Arcadia, but almost all of these are within National Park area. Less than 30 per cent confidence of presence in Fairview and Roma Other CSG fields, due to smaller patch size and higher surrounding fragmentation of habitat.	Vulnerable	55.2	0.5	55.7

<i>Rostratula australis</i> Australian painted snipe	Potentially any wetland (usually shallow and temporary types); also farm dams with suitable vegetation cover. Potentially on other Res that form gilgas e.g. RE 11.4.3 and 11.9.5, but mapping these communities would over-estimate habitat. Likely to occur anywhere within suitable habitat across CSG fields, but difficult to detect (being a cryptic species).	Vulnerable	106.8	99.3	206.1
Reptiles					
<i>Egernia rugosa</i> Yakka skink	Found in most vegetation and substrate types except landzone 10 and also avoids Coolabah (RE 11.3.3). Able to live in clearings providing there are suitable shelter sites (e.g. tunnel erosion) which most frequently occurs on RE 11.3.2. Patchy distribution but can be difficult to detect – likely to be more widespread than records indicate; recorded from Arcadia Valley, Lonesome Holding, Mt Hutton, Womblebank Road, Cobbadah, Moonie area, Yuleba-Surat Rd and Roma area.	Vulnerable	298.8	345.6	644.4
<i>Furina dunmalli</i> Dunmall's snake	Extremely sparsely distributed throughout entire study area. Recorded from Expedition Range and Taroom town area; very poorly known species which is difficult to detect; likely to be more widespread than records indicate but in very low densities.	Vulnerable	672	541.6	1213.6
<i>Paradelma orientalis</i> Brigalow scaly-foot	Occurs in a wide variety of substrates and veg types throughout. Lives in brigalow / vine thicket regrowth, but not tolerant of clearings. Known from Expedition Range, Fairview, Carnarvon Range and Grafton Range near Roma; likely to be throughout the northern CSG fields wherever there is intact vegetation and suitable microhabitat.	Vulnerable	672	541.6	1213.6



<i>Denisonia maculate</i> Ornamental snake	Dawson, Fitzroy and Comet River catchments only (i.e. on northern side of Great Dividing Range only). Preference for alluvial and clay substrates with tolerance of clearing. No confirmed records from Fairview and Roma Other CSG fields, so less than 50 per cent confident this species occurs in those two fields. Recorded from Lake Nuga Nuga; likely along watercourses with clay substrates within Dawson-Fitzroy drainage.	Vulnerable	126	173.3	299.3
<i>Delma torquata</i> Collared delma	Known from landzone 10 in Expedition Range. Known from remnant RE11.3.2 along stock routes west of Roma.	Vulnerable	246	102.7	348.70

I note that species and proposed clearing areas nominated in the proponent's environmental offset strategy significantly differ from the abovementioned information. Cleared areas in the proposed offset strategy are based on the proponent's 'Reasonable Worst-Case' scenario (multiple drill holes from one drill pad).¹⁰⁵

EPBC listed fauna species—Overall impacts and mitigation measures

Mammals

I note that the EIS concludes that with appropriate management, potential impacts to EPBC listed mammal species from development of the CSG fields will be negligible.

Further I note that the proponent commits to undertake site scouting and Phase 2 ecological surveys prior to infrastructure development to minimise potential impacts to EPBC listed mammals.

Reptiles

I note that the EIS concludes that with appropriate management, potential impacts to EPBC listed reptile species from development of the gas field s will be negligible.

Further I note that the proponent commits to undertake site scouting and Phase 2 ecological surveys prior to infrastructure development to minimise potential impacts to EPBC listed reptile species.

Birds

I note that the EIS states that areas to be impacted by the development of the CSG field are not considered to provide core habitat for any of the EPBC listed bird species. Further the EIS states that given the proposed impacts from the CSG field will be generally restricted to areas previously cleared of vegetation, the proposed action is not expected to significantly impact upon EPBC listed bird species.

Further I note that the proponent commits to undertake site scouting and Phase 2 ecological surveys prior to infrastructure development to minimise potential impacts to EPBC listed bird species.

Fish

I note that the EIS reports that the Murray Cod (*Maccullochella peelii peelii*), having an EPBC Act status of 'Vulnerable', is widespread throughout the Murray-Darling system. However, the EIS concludes that

¹⁰⁵ Refer to Environmental Offset Strategy prepared by Ecofund Queensland (for the GLNG Project) in conjunction with and based upon information provided by Santos (3 March 2010) p.25.

significant impacts to any population of this species from the CSG field are unlikely due to their widespread distribution and the stocking of fished impoundments of this species.

Molluscs

I note that the EIS reports that the boggomoss snail (*Adclarkia dawsonensis*), having an EPBC Act status of 'Endangered', is found in the greater Taroom area and in the Dawson Valley (north-east of Taroom) on the Dawson River, however it is unlikely that it occurs within the CSG field area. **Further I note** the EIS concludes impacts to this species are likely to be negligible.

EPBC listed flora species—direct impacts to individual species

The EIS reported that no EPBC listed flora species were recorded during field surveys within the RFDA between September and November 2008, however, eleven (11) species are considered to be potentially present within areas of remnant vegetation.

EPBC listed flora species—overall impacts and mitigation measures

I note that the EIS concludes that the proposed impacts from the CSG field will generally be restricted to areas previously cleared of vegetation, hence the proposed action is not expected to significantly impact upon EPBC listed flora species.

Further I note that the proponent commits to undertake site scouting and Phase 2 ecological surveys prior to infrastructure development to minimise potential impacts to EPBC listed flora species.

Listed migratory species (EPBC Act sections 2.0 and 20A)

The EIS reports that a total of seventeen (17) EPBC listed migratory bird species were identified (in a MNES search) as potentially present within the CSG field search area, including eight (8) migratory terrestrial bird species, six (6) migratory wetland birds, and five (5) migratory marine bird species.¹⁰⁶

Overall impact and mitigation

I note that the EIS reported that significant impacts are unlikely for each of the seventeen (17) species identified, and **hence I note** that no mitigation measures are proposed.

10.7.2 Gas transmission pipeline

The proponent's assessment of potential impacts and mitigation measures is provided in Section 6 of EIS Appendix G - *EPBC Controlled Action Assessment Report*.

I note that the EIS proposes that the gas transmission pipeline is to be approximately 425 km in length, within a 30 m wide easement on the mainland and 100 m wide easement on Curtis Island. **I therefore note** that relevant EPBC Act species identified and habitat areas to be disturbed, as reported in the EIS, are based on these pipeline easement dimensions.

However I note that the SEIS proposes an increase of the mainland pipeline easement to a 40 m width. Hence, final determinations of impacts and offsets should take this increased area into account. **Further I note** that the proponent's environmental offset strategy¹⁰⁷ bases offset calculations on a 40 m wide ROW, and reducing this to 30 m where traversing Endangered or Of Concern regional ecosystems and riparian corridors. The pipeline easement on Curtis Island has been reduced to 40m, since it will not now contain a roadway as the bridge and road referral are not being pursued.

Further I note that DERM advises there is insufficient information in the EIS and SEIS to assess the potential environmental impacts of the crossing of The Narrows (Humpy Creek to Laird Point) including the Kangaroo Island wetlands. DERM advise that the current information does not demonstrate that the construction of the pipeline, in a technically constrained area, is possible. In particular, a general construction methodology has been provided for the pipeline but the methodology does not address the inter-tidal areas that the pipeline would be traversing.

¹⁰⁶ Refer to Table 4.3 in EIS, Appendix G - EPBC Controlled Action Assessment Report.

¹⁰⁷ Prepared by Ecofund Queensland (for the GLNG Project) in conjunction with and based upon information provided by Santos, 3 March 2010.



I note DERM is unclear how the proposed route in the EIS and SEIS relates to the route and construction methodology provided by the joint proponent Technical Working Group for a 'bundled' crossing of The Narrows, aimed to cater for up to four proposed pipeline crossings and hence minimise cumulative impacts. **I note** that DERM requests a detailed illustrated and site specific construction methodology for the crossing of the Kangaroo Island wetlands and The Narrows be provided, including information on necessary ancillary works. Further, DERM requires that the methodology be supported by a site specific Acid Sulfate Soils Management Plan. In addition, DERM requests an assessment be provided of the potential impacts to the values of the Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park based on the proposed construction methodology and associated mitigation measures. Further, DERM have requested an assessment be provided of the cumulative impacts to Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park that would result from up to four proposed pipeline crossings using similar construction methodology and mitigation measures.

I therefore note that the potential impacts to matters of NES associated with a 'bundled' pipeline crossing of The Narrows have not been directly examined in the EIS or SEIS; and hence have not been presented as part of this report.

I consider that where more than two gas transmission pipelines will be constructed across the Kangaroo Island wetlands, then the route proposed by Queensland Gas Company on behalf of Queensland Curtis LNG, Gladstone LNG, Australia Pacific LNG and Shell Australia LNG should be utilized, and construction should be with a bundled approach following a methodology that **I will approve** which may be based on the document: *GLNG Pipeline FEED – Report of Mechanised Marine Crossing Installation Concept*, dated 24 February 2010. (See Conditions 18-26, Appendix 3, Part 2).

World Heritage properties (EPBC Act sections 12 and 15A)

The EIS states that the construction of the proposed marine pipeline crossing will involve dredging in Port Curtis, between Friend Point on the mainland and Laird Point on Curtis Island, resulting in direct impacts to soft-bottom communities and indirect impacts to seagrass north of Fishermans Landing on the mainland.

The EIS reports that the proposed marine pipeline crossing is within the Great Barrier Reef World Heritage Area (GBRWHA). The boundary of the GBRWHA is set at mean low water mark on the mainland. The World Heritage criteria against which the Great Barrier Reef was listed in 1981 remain the formal criteria for this property. The EIS finds that it is likely that the pipeline will impact upon World Heritage criteria, as follows:

Table 10.9 – Pipeline Impacts on World Heritage Criteria

Great Barrier Reef World Heritage criterion	Impacts and mitigation measures
Exceptional natural beauty and aesthetic importance (Criterion VII)	Low direct impacts to the exceptional natural beauty and aesthetic importance of the WHA (at Friend Point and Laird Point), however some direct impacts to the exceptional natural beauty and aesthetic importance of The Narrows. Port Curtis is a heavily industrialised Port with major impacts already occurring for this value.
Significant geomorphic or physiographic features (Criterion VIII)	No impact on significant geomorphic or physiographic features that contribute to WHA values. No coral reefs or cays within the vicinity.

<p>Significant ongoing ecological and biological processes (Criterion IX)</p>	<p>Direct interactions with migratory marine mammals (including marine turtles, dugong and dolphins) are likely, and are proposed to be mitigated through watches during dredging and shipping activities. Marine turtles and dugong feed on seagrass meadows within Port Curtis.</p> <p>No impacts on the Humpback whale are anticipated, as the species has not been sighted within Port Curtis.</p> <p>No direct impacts on coral reefs are anticipated, and it is unlikely that The Narrows provides preferred spawning ground habitat, thus indirect impacts considered to be negligible. Nearest coral communities are 10km south of marine pipeline crossing.</p>
<p>Significant natural habitat for in-situ conservation of biological diversity (Criterion X)</p>	<p>Direct impacts on mangrove communities are likely, particularly as part of pipeline trenching activities at Friend and Laird Point. Impacts minimised via silt curtains and other methods proposed to be developed in dredge management plans and construction management plans and in accordance with the <i>Fisheries Act 1994</i> (Qld).</p> <p>Direct impacts to seagrass meadows north of Fishermans Landing due to increased turbidity. Short-term impacts to marine turtles and dugong, as these feed on seagrass meadows. Impacts to be minimised through use of sediment limitation devices (silt curtains).</p> <p>No direct impacts on coral reefs, as nearest coral communities are 10km south of marine pipeline crossing.</p>

The EIS finds that Criterion VII and X are the most likely to be impacted.

National Heritage places (EPBC Act sections 15B and 15C)

The Great Barrier Reef World Heritage property is listed as a National Heritage Place. Therefore part of the gas transmission pipeline will be located within a National Heritage Place. The EIS finds that it is likely that the pipeline will impact upon National Heritage Values as follows¹⁰⁸:

Table 10.10 - Pipeline Impacts on National Heritage Places

<p>Outstanding Heritage Value The place has outstanding heritage value to the nation because of the place's:</p>	<p>Impacts and mitigation measures</p>
<p>Importance in the course or pattern of Australia's natural cultural history.</p>	<p>The Narrows represents: an uncommon passage landscape and is one of only five narrow tidal passages separating large continental islands from the mainland in Australia; and an important indicator of past geomorphologic (sedimentation) processes.</p>

¹⁰⁸ Refer to EIS, G – EPBC Report, Section 6, Table 6.2



	Mitigations measures for pipeline trenching include the use of silt curtains, and timing of activities to reduce impacts.
Possession of uncommon, rare or endangered aspects of Australia's natural or cultural history.	<p>The sandy channel between Friend Point and Laird Point contain soft coral, sponges and sea pen species.</p> <p>Direct impacts include some loss of mangrove and saltmarsh in intertidal areas, however there is no resulting impact on outstanding national heritage values.</p> <p>Direct interactions with migratory marine mammals (including marine turtles, dugong and dolphins) are likely, and are proposed to be mitigated through watches during dredging and shipping activities. Marine turtles and dugong feed on seagrass meadows within Port Curtis.</p> <p>No impacts on the Humpback whale are anticipated, as the species has not been sighted within Port Curtis.</p> <p>No direct impacts on coral reefs are anticipated (as nearest coral communities are 10km south of marine pipeline crossing), and it is unlikely that The Narrows provides preferred spawning ground habitat, thus indirect impacts considered to be negligible. Nearest coral communities are 10km south of marine pipeline crossing.</p>
Potential to yield information that will contribute to an understanding of Australia's natural or cultural history.	Impacts to these values are considered negligible.
Importance in demonstrating the principal characteristics of: a class of Australia's natural or cultural places; or a class of Australia's natural or cultural environments.	The GBR is important for its cultural heritage for indigenous populations within Australia in providing habitat for species used as a food source and for culturally significant events. Mitigation measures include inspections in consultation with traditional owners or archaeologists.
Importance in exhibiting particular aesthetic values by a community or cultural group.	Impacts to the aesthetic values will be negligible.

Further examples of impacts and mitigation strategies are provided in Table 6.2 of EIS, EPBC Report, Section 6 and in Table 6.1 of EIS Appendix G.

Listed threatened species and communities (EPBC Act sections 18 and 18A)

Mainland – Habitat values

The EIS reports that the mainland gas transmission traverses a large variety of ecosystems and landforms. The mainland gas transmission pipeline habitat values are described in Section 2.2.5 of EIS Appendix N – Nature Conservation, N2 – *Gas Transmission Pipeline* (Fauna), including value descriptions for the Carnavon Range, Expedition Range, Dawson Range, Callide Range, Calliope Range.

Whilst much of the alignment has been historically cleared for grazing and cropping purposes, areas of remnant bushland will be traversed in several sections along the gas transmission pipeline, primarily on

the low ranges encountered. Several core areas of remnant vegetation, primarily on the Calliope, Callide, Dawson, Expedition and Carnavon Ranges are likely to act as valuable habitat for fauna.

The fertile nature of the alluvial soils along the gas transmission pipeline alignment has resulted in the majority of alluvial vegetation communities being cleared or thinned for cropping and grazing. As a result, a narrow riparian corridor is often the only remaining vegetation in these fragmented landscapes.

I note that the EIS assessment of aquatic habitat values is described in Appendix A of EIS Appendix O2 - Surface Water - Gas Transmission Pipeline and in EIS, Section 7.05 - Gas transmission pipeline environmental values and management of impacts - Surface water. **I also note** that the SEIS assessment (E4 - Surface Water) did not identify any additional impacts to aquatic habitat values. The proponent has concluded that the potential impacts and mitigation measures for the EIS gas transmission pipeline (March 2009), as summarised in EIS Section 7.5 and EIS Appendix AA, remain applicable for the study area.

Mainland—terrestrial fauna diversity

The EIS reports that a desktop review of relevant environmental databases identified forty-six (46) significant fauna species, recognised under various categories of the NC Act or EPBC Act, in the study area for the gas transmission pipeline.

The EIS reports that flora and fauna site assessments¹⁰⁹ for the mainland gas transmission pipeline section were undertaken between 30 June 2008 and 25 July 2008 and between 6-10 October 2008, including over a large area between the Expedition Range and Calliope.

Seventy two (72) native and eight (8) introduced terrestrial species were recorded. Native species included two (2) reptiles, sixty-four (64) bird and five (5) mammal species.¹¹⁰ Of these three (3) significant fauna species (recognised under various categories of the NC Act or EPBC Act) were recorded: squatter pigeon (*Geophaps scripta scripta*) (Listed as 'Vulnerable' under NC Act and EPBC Act); powerful owl (*Ninox strenua*) (Listed as 'Vulnerable' under NC Act); glossy black cockatoo (*Calyptorhynchus lathami lathami*) (Listed as 'Vulnerable' under NC Act).

The SEIS undertook further ecological assessments of gas transmission pipeline alternative route options, as a result of design changes arising from EIS consultation and further investigations, incorporating:

- west of the Bruce Highway - two alternative pipeline alignments, including a Common Pipeline Infrastructure Corridor (CPIC) designated within the Callide Infrastructure Corridor State Development Area (CICSDA), and a Callide Range Alternative Route (CRAR)
- within the Gladstone State Development Area (GSDA)¹¹¹ - two alternative pipeline alignments, and
- Curtis Island – two alternative pipeline alignments.¹¹²

Mainland—aquatic fauna diversity

The proposed route traverses a number of surface water bodies including: 'The Narrows' (marine waters between Curtis Island and the mainland); upper reaches of Calliope River; Callide Creek; and Dawson River and a number of its tributaries.

The EIS reports that twenty four (24) aquatic site assessments on eighteen (18) waterways were undertaken on creeks and rivers along the gas transmission pipeline to evaluate aquatic habitat.¹¹³ Assessments determined that most aquatic ecosystems found along the mainland gas transmission

¹⁰⁹ The survey methodology is described in Appendix B in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹¹⁰ Refer to Appendix C in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹¹¹ The GSDA extends approximately 20 km from the Bruce Highway, in a north-east direction, across The Narrows marine area to Curtis Island.

¹¹² Refer to SEIS, Attachment E – Gas Transmission Pipeline, E3 - Nature Conservation.

¹¹³ The survey methodology is described in Appendix B in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).



pipeline are ephemeral. However, systems such as the Calliope and Dawson Rivers are permanent or comprise permanent isolated waterholes.

I note that DERM advises that the overall approach to the identification and assessment of wetlands and other aquatic values in proximity to the pipeline is inadequate. DERM finds the assessment has not used the existing available mapping and information including Queensland Wetland Mapping. DERM advise that whilst the SEIS prescribes a process by which aquatic ecosystems (including wetlands) would be allocated to Sensitive Area Criteria, in the constraints mapping for the gas fields, there is a lack of evidence that an appropriate level of assessment of the pipeline route has been undertaken to adequately identify the values. DERM advise that this has significant implications in relation to proposed mitigation and monitoring protocols for actions including construction, rehabilitation and maintenance of watercourse crossings.

I require that a detailed assessment of aquatic values along the pipeline route should be provided. Site specific data should be included that accurately and comprehensively describes the environmental values and ecological condition at each aquatic site. The information should be used to determine the location of each watercourse crossing and site specific mitigation measures.

In addition, **I require** that the information demonstrate that mitigation measures for permanent creek crossings are consistent with *AS2885 – Pipelines – Gas, Liquid and Petroleum and the Australian Pipeline Industry Association Code of Environmental Practice*. DERM advises that these documents provide the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction of the pipeline, including:

- minimisation of adverse impacts on fauna and significant habitat areas
- minimisation of impacts on riparian, aquatic and water dependent flora and fauna
- minimise erosion and sediment impacts
- maintain water quality and water flow requirements,
- maximise rehabilitation success of achieving long term site stability.

Further, **I require** that the design of all creek crossings and waterway barrier works take account of the matters discussed in Waterway barrier works development approvals (Fish Habitat Management Operational Policy FHMOP 008, DPLandF, July 2009). DERM advise that the Department of Employment, Economic Development and Innovation (DEEDI) and DERM departmental staff should be engaged in the preliminary planning and design of all creek crossing and waterway barrier works.

Curtis Island—habitat values

The EIS reports that the gas transmission pipeline is proposed to be constructed primarily in the basin of a narrow fluvial valley. Mangrove and saltmarsh communities are present within intertidal areas. The valley is dominated by Eucalyptus and Corymbia woodland (mostly regrowth - due to past grazing and clearing), with mature trees along ephemeral creeks in low-lying areas.

I note that the EIS assessment of Curtis Island habitat values are described in Section 2.2.3 of in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

Curtis Island—terrestrial fauna diversity

Desktop review of relevant environmental databases¹¹⁴ identified forty-six (46) significant fauna species, recognised under various categories of the NC Act or EPBC Act, in the study area for the gas transmission pipeline.¹¹⁵

The EIS reports that the Curtis Island gas transmission pipeline fauna survey component was undertaken between 14 and 23 May 2008.¹¹⁶ The EIS reports that the diversity found on the site was very low, and

¹¹⁴ Databases are identified in Section 1.3 of EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹¹⁵ Refer to Appendix A in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹¹⁶ The survey methodology is described in Appendix B in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

many of the species that might be expected to be present were not detected (perhaps due to the extended drought conditions the preceding year, among other reasons).¹¹⁷

A total of fifty-one (51) native and five (5) introduced vertebrate species were observed during the survey.¹¹⁸ Native species included one (1) amphibian, five (5) reptiles, thirty-nine (39) bird and seven (7) species of native mammals. Of these only one (1) significant fauna species was recorded: the powerful owl (*Ninox strenua*) (Listed as 'Vulnerable' under NC Act).

Curtis Island—Aquatic fauna diversity

The EIS reports that there are no permanent freshwater bodies present within the Curtis Island gas transmission pipeline area, and although no water was present within the ephemeral waterways during the survey, semi-aquatic fauna such as frogs are expected to be present.¹¹⁹

Threatened ecological communities

Pipeline Section West of Bruce Highway

The SEIS reports that three (3) regional ecosystems of conservation significance to be potentially cleared within the proposed 30 m ROW section west of the Bruce Highway, as follows:

Table 10.11 – Regional Ecosystems Potentially Cleared by Pipeline

Regional ecosystem	Community description	EPBC Act status	Area impacted (ha)	Alignment in which RE is present
11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	1.23	GLNG Gas Transmission Pipeline (September 2009) SW section
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristate</i> open forest on fine-grained sedimentary rocks	Endangered	3.2	GLNG Gas Transmission Pipeline (September 2009) SW section
11.9.4b	Semi-evergreen vine thicket on fine grained sedimentary rocks	Endangered	2.13	GLNG Gas Transmission Pipeline (September 2009) SW section

The proponent states that these ecological communities will be identified prior to clearing and will be retained where practicable. Further, minor clearing is expected to be required within these communities, and hence no significant impacts are anticipated.

I note that the proponent's environmental offset strategy proposes that a total of 4.7 ha of *Acacia harpophylla* is to be cleared for construction of the gas transmission pipeline.

Pipeline Section within Gladstone State Development Area

The SEIS reports that one (1) EPBC Act listed community was recorded within the 200 metre study corridor of both the CPIC (GSDA Section) Route and GLNG (September 2009) Alignment; namely RE11.11.18 *Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding* (Endangered).¹²⁰

¹¹⁷ Refer to Section 2.2.2 in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹¹⁸ Refer to Appendix C in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna), and in N2 – Gas Transmission Pipeline (Flora).

¹¹⁹ Section 2.2.2 in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹²⁰ Refer to Section 4.2.5 in SEIS Attachment E - Gas Transmission Pipeline, E3 – Nature Conservation, Part 3 – Gladstone State Development Area.



I note that the environmental offset strategy proposes that a total of 2.41 ha of Semi-evergreen vine thicket will be cleared for construction of the gas transmission pipeline.

Curtis Island Section

The SEIS reports that there are no EPBC listed communities within the Curtis Island section of the gas transmission pipeline study area.¹²¹

Threatened species

EPBC listed fauna species—direct impacts to individual species

The EIS reports that a desktop review of relevant environmental databases¹ identified forty-six (46) significant fauna species, recognised under various categories of the NC Act or EPBC Act, in the study area for the gas transmission pipeline.¹

The EIS reports that flora and fauna site assessments¹²² for the mainland gas transmission pipeline section were undertaken between 30 June 2008 and 25 July 2008 and between 6-10 October 2008, including over a large area between the Expedition Range and Calliope.

Migratory terrestrial birds, migratory wetland birds, migratory marine birds, marine reptiles, marine mammals and sharks are discussed in the Listed Migratory Species section of this report.

Terrestrial fauna

Seventy two (72) native and eight (8) introduced terrestrial species were recorded as part of the abovementioned fauna site assessments. Native species included two (2) reptiles, sixty-four (64) bird and five (5) mammal species.¹²³ Of these three (3) significant fauna species (recognised under various categories of the NC Act or EPBC Act) were recorded: squatter pigeon (*Geophaps scripta scripta*) (Listed as 'Vulnerable' under NC Act and EPBC Act); powerful owl (*Ninox strenua*) (Listed as 'Vulnerable' under NC Act); glossy black cockatoo (*Calyptorhynchus lathami lathami*) (Listed as 'Vulnerable' under NC Act).

Terrestrial birds

The EIS reports that ten (10) EPBC listed bird species were identified in database searches for the study area (further details below). However, only one species (squatter pigeon) was recorded during field surveys of the pipeline study area. **I note** that the proponent's environmental offset strategy proposes that 5.6 ha of squatter pigeon habitat (i.e. grassy woodlands and open forests that are dominated by eucalypts) is proposed to be cleared for construction of the gas transmission pipeline.

The EIS concludes that the proposed pipeline corridor disturbance area is not considered to provide core habitat for any of these species; hence the EIS concludes that impacts to these species as a result of pipeline trenching activities are likely to be negligible.

The EPBC listed red goshawk (*Erthrotriorchis radiatus*, Vulnerable) was identified in database searches for the study area. The EIS finds that although vegetation on the pipeline corridor generally does not form core habitat for this species, opportunities may exist in densely vegetated gullies as found within the range crossings. Nevertheless, the EIS concludes that the proposed pipeline is unlikely to significantly impact this species.

The EPBC listed swift parrot (*Lathamus discolor*, Endangered) was identified in database searches for the study area. The EIS finds that the pipeline corridor area is at the northern extent of range of the species, and that it may occasionally utilize woodlands in the area, depending upon resource availability; hence the EIS concludes that significant impacts to this species is unlikely.

The EPBC listed black-throated finch (*Peophila cincta cincta*, Endangered) was identified in database searches for the study area. The EIS concludes that although the species may be present along the pipeline route, the proposed action is unlikely to impact these species due to the abundance of alternative suitable habitat in the region.

¹²¹ Refer to SEIS Attachment E - Gas Transmission Pipeline, E3 – Nature Conservation, Part 4 – Curtis Island.

¹²² The survey methodology is described in Appendix B in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

¹²³ Refer to Appendix C in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

The EPBC listed star finch (eastern) (*Neochimbia ruficauda*) and roseate tern (*Sterna dougalli*) were identified in database searches for the study area. The EIS reports that limited suitable habitat may be present within the corridor disturbance area; hence significant impacts to these species are unlikely.

The EPBC listed Kermadec petrel (western) (*Pterodroma neglecta neglecta*, Vulnerable) was identified in database searches for the study area. However, the EIS reports that the species are not expected anywhere along pipeline route; hence impacts to this species are unlikely.

The EPBC listed black-breasted button quail (*Turnix melanogaster*) was identified in database searches for the study area. The EIS reports that small areas of suitable (although disturbed) habitat potentially exist in the vicinity of the proposed pipeline route near the Curtis coast; however the EIS concludes that the proposed action is not expected to impact this species due to superior habitat available elsewhere throughout the region.

Terrestrial reptiles

The EPBC listed Brigalow scaly-foot (*Paradelma orientalis*, Vulnerable), Ornamental Snake (*Denisonia maculate*, Vulnerable), Yakka skink (*Egernia rugosa*, Vulnerable) and Dunmall's snake (*Furina dunmali*, Vulnerable) were identified in database searches for the study area. Scouting for these species prior to construction within suitable habitat is proposed. The EIS concludes that given suitable planning it is not expected that this species will be impacted.

The EPBC listed Fitzroy tortoise (*Rhoedytis leukops*, Vulnerable) was identified in database searches for the study area. However, the EIS concludes that the potential impacts to this species are unlikely as the species is only found within the drainage of the Fitzroy River. **However, I note** that DERM advises the mitigation of potential impacts resulting from the construction of pipeline crossings in areas of potential habitat for the Fitzroy turtle and *Elseya albagula* (white throated snapping turtle) are not adequately addressed. DERM requests that all pipeline construction works and site preparations in catchment areas that may support *R. leukops* and *E. albagula* should be undertaken outside of breeding and nesting periods. Unless otherwise agreed by DERM, horizontal directional drilling must be undertaken at all wetland crossings within the known distribution of *R. leukops* and *E. albagula* with a minimum buffer width exceeding the maximum recorded lateral distance of nesting from the waterway.

Terrestrial mammals

The EPBC listed Large-eared pied bat (*Chalinolobus dwyeri*, Vulnerable), Grey-headed flying fox (*Pteropus poliocephalus*, Vulnerable); and Eastern long-eared bat (*Nyctophilus timoriensis*) were identified in database searches for the study area. The EIS concluded that these species should not be impacted by the pipeline disturbance due to the abundance of alternative suitable habitat in the region.

The EPBC listed Northern quoll (*Dasyurus hallucatus*, Endangered), was identified in database searches for the study area. The EIS reports that this species is unlikely to be present given the disturbed nature of most habitats surveyed; hence the EIS concludes that the species is unlikely to be significantly impacted.

The EPBC listed Semon's leaf-nosed bat (*Hipposideros semoni*, Endangered) was identified in database searches for the study area. The EIS reports that removal of arboreal hollows along the proposed pipeline route may potentially impact this species, however, the EIS concludes that it is unlikely to significantly impact the species as fragmentation of the habitat is not expected to have long term impacts on populations.

The EPBC listed Water mouse (*Xeromys myoides*, Vulnerable) was identified in database searches for the study area. The EIS concludes that it is unlikely that this species is present on the mainland coast near Gladstone due to industrial and recreational impact.

Section west of Bruce Highway

The SEIS reports that investigations of alignment options investigated for the pipeline section west of the Bruce Highway, undertaken as part of supplementary studies, did not present any significant variation of habitat or potential impacts to those assessed in the EIS.¹²⁴

Further mitigation of potential impacts to fauna are presented in the SEIS, Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Section 3.2 Impact Mitigation.

¹²⁴ Refer to SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Section 2.2.7.



Section within Gladstone State Development Area

The SEIS reports that the saltwater crocodile (*Crocodylus porosus*), an EPBC listed migratory marine species, is known to infrequently utilise the estuarine habitats of the Gladstone area. The SEIS concludes that given the mobility of the saltwater crocodile and the relative abundance of species habitat in the area, the potential for the pipeline to impact on this species is minimal.¹²⁵ This species is included in the Listed Migratory Species section below. **I note** that no other EPBC listed fauna are identified for the in the GSDA section of the pipeline.

I note that potential impacts and mitigation measures associated with loss of fauna habitats and fragmentation in the GSDA section of the pipeline are found in SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Part 3 – GSDA, Section 5.1.6 and 5.1.7.

Curtis Island Section

I note that further desktop assessments of vegetation mapping and aerial photography were undertaken as part of SEIS studies; however no further fauna surveys were conducted as part of SEIS studies apart from a targeted field survey for 'Essential habitat' for koala (*Phascolarctos cinereus*). **I also note** that the SEIS concludes that fauna habitat values of both the GLNG gas transmission pipeline (September 2009) and the CPIC (GSDA Section) route alignments on Curtis Island are not considered to be appreciably different to those presented in the EIS. The proponent hence refers to EIS Appendix N2 for further information regarding fauna studies for Curtis Island.

I therefore note that the EIS and SEIS conclude that no significant impacts to EPBC listed fauna species are likely as a result of construction of proposed GLNG gas transmission pipeline on Curtis Island.

EPBC listed flora species—direct impacts to individual species

The EIS identified twenty-seven (27) EPBC Act listed flora species as potentially present within areas of remnant vegetation along the pipeline corridor, based on database searches undertaken for the project.¹²⁶

The EIS reports that flora and fauna site assessments¹²⁷ for the mainland gas transmission pipeline section were undertaken between 30 June 2008 and 25 July 2008 and between 6-10 October 2008, including over a large area between the Expedition Range and Calliope.

The EIS reports that one (1) plant species listed under the EPBC Act (*Cycas megacarpa*, Endangered) was recorded from field surveys of the pipeline study area. The pipeline corridor intersects the margins of the populations where densities of these species are lower. Some individual plants are likely to require translocation as part of vegetation clearing activities. **I note** that the environmental offset strategy proposes that a total of 27.8 ha of *Cycas megacarpa* habitat (i.e. Woodland, open woodland and open forests, often with a grassy understory) will be cleared for construction of the gas transmission pipeline.

The other listed flora species, include: *Acacia grandifolia* (Vulnerable); *Aspenium pellucidum* (Vulnerable); *Atalaya collina* (E); *Bertya opposens* (Vulnerable); heart-leaved bosistoa (*Bosistoa selwynii*, Vulnerable); three-leaved bosistoa (*Bosistoa transversa*, Vulnerable); miniature moss-orchid (*Bulbophyllum globuliforme*, Vulnerable); Ooline (*Cadellia pentastylis*, Vulnerable); wedge-leaf tuckeroo (*Cupaniopsis shirleyana*, Vulnerable); *Commersonia sp. Cadarga* (Vulnerable); *Cossinia (Cossinia australiana*, Endangered); *Cupaniopsis shirleyana* (Vulnerable); *Cycas megacarpa* (Endangered); *Denhamia parvifolia* (Vulnerable); king blue-grass (*Dichanthium queenslandicum*, Vulnerable); finger panic grass (*Digitaria porrecta*, Endangered); Tricolour diuris (*Diuris sheaffiana*, Vulnerable); *Eucalyptus raveretiana* (Vulnerable); *Leionema obtusifolium* (Vulnerable); *Leucopogon cuspidatus* (Vulnerable); *Macadamia integrifolia* (Vulnerable); *Macrozamia fearnsidei* (Vulnerable); *Macrozamia platyrhachis* (Endangered); *Parsonia larcomensis* (Vulnerable); Quassia (*Quassia bidwilli*, Vulnerable); Minute orchid (*Taeniophyllum muelleri*); and *Trymalium minutiflorum* (Vulnerable).

¹²⁵ Refer to SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Part 3 – GSDA, Section 4.3 - Fauna, p. 17.

¹²⁶ Refer to EIS, G – EPBC Report, Section 6, Table 6.3.

¹²⁷ The survey methodology is described in Appendix B in EIS, Appendix N – Nature Conservation, N2 – Gas Transmission Pipeline (Fauna).

The EIS concludes that pipeline construction is not expected to significantly impact upon EPBC listed flora species.¹²⁸

Section West of Bruce Highway

The SEIS reports that no additional EPBC listed flora were recorded in surveys of the pipeline section west of the Bruce Highway undertaken as part of supplementary studies.¹²⁹

Section within Gladstone State Development Area

I note that the SEIS reports that desktop literature review investigations undertaken as part of supplementary studies identified thirteen (13) EPBC listed flora species as potentially present within the study area, including: *Asplenium pellucidum* (Vulnerable); *Atalaya collina* (Endangered); *Bosistoa selwynii* (Vulnerable); *Bosistoa transversa* (Vulnerable); *Bulbophyllum globuliforme* (Vulnerable); *Cupaniopsis shirleyana* (Vulnerable); *Cycas megacarpa* (Endangered); *Denhamia parvifolia* (Vulnerable); *Grevillea hockingsii* (Vulnerable); *Leucopogon cuspidatus* (Vulnerable); *Parasonsia larcomensis* (Vulnerable); *Polianthion minutiflorum* (Vulnerable); and *Quassia bidwillii* (Vulnerable).¹³⁰

In addition, the SEIS reports that flora surveys for the GSDA section of the GLNG GTP (September 2009) and CPIC (GSDA Section) Route were undertaken from 14-18 September 2009. Field surveys identified 71 taxa, representing 36 families and 65 genera. **However, I note** that the surveys did not find any EPBC listed flora species present within the study area.¹³¹

Curtis Island section

I note that further desktop assessments of vegetation mapping and aerial photography were undertaken as part of SEIS studies; however no further flora surveys were conducted as part of SEIS studies. **I also note** that no EPBC listed flora species have been identified in SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Part 4 - Curtis Island, Section 3.1 – Potential Impacts.

Listed migratory species (EPBC Act sections 20 and 20A)

Thirty-three (33) protected migratory bird and other marine fauna species were identified as potentially being present within the gas transmission corridor search areas.¹³²

Migratory Bird species on the mainland and Curtis Island are reported in EIS, Appendix N2 - *Gas Transmission Pipeline (Fauna)*.¹³³ Migratory shorebirds in the vicinity of the proposed gas transmission pipeline and LNG facility are described in detail within Section 3.4.3 of the Curtis Island LNG facility Fauna Survey report.

Migratory terrestrial birds

The EIS identifies the following EPBC listed migratory terrestrial bird species as potentially present in the gas transmission pipeline study area (according to database searches): White-bellied sea-eagle (*Haliaeetus leucogaster*); White-throated needletail (*Hirundapus caudacutus*); Barn swallow (*Hirundo rustica*); Rainbow bee-eater (*Merops ornatus*); Black-faced monarch (*Monarcha melanopsis*); Spectacled monarch (*Monarcha trivirgatus*); Satin flycatcher (*Myiagra cyanoleuca*); and Rufous fantail (*Rhipidura rufifrons*).

The EIS concludes that potential impacts to these species due to proposed actions are unlikely.

Migratory wetland birds

The EIS identifies the following EPBC listed migratory wetland bird species as potentially present in the gas transmission pipeline study area (according to database searches): Great egret (*Ardea alba*); Cattle

¹²⁸ Refer to Refer to EIS, G – EPBC Report, Section 6, p 6-35.

¹²⁹ Refer to SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Section 2.2.1

¹³⁰ Refer to SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Part 3 – GSDA, Section 4.2 and Appendix A.

¹³¹ Refer to SEIS Attachment E – Gas Transmission Pipeline, E3 – Nature Conservation, Part 3 – GSDA, Section 4.2 and Appendix B.

¹³² Source: EPBC Referral 2008/4096.

¹³³ See section 2.2.8.



egret (*Ardea ibis*); Latham's snipe (*Gallinago hardwickii*); Australian cotton pygmy-goose (*Nettapus coromandelianus*); Little curlew (*Numenius minutus*); and Painted snipe (*Rostrattula benghalensis s. lat.*).

The EIS concludes that potential impacts to these species due to proposed actions are unlikely.

Migratory marine birds

The EIS identifies the following EPBC listed migratory marine bird species as potentially present in the gas transmission pipeline study area (according to database searches): Fox-tailed swift (*Apus pacificus*); Great egret (*Ardea alba*); Cattle egret (*Ardea ibis*); Southern giant-petrel (*Macronectes giganteus*); and Little tern (*Sterna albifrons*).

The EIS reports that use of the mud flats along the mainland north of Fishermans Landing by migratory shorebirds is considered to be low. The EIS concludes that considering the vast extent of mudflats within Port Curtis, it is anticipated that there will be negligible disturbance to breeding colonies of seabirds.¹³⁴

The EIS concludes that potential impacts to migratory marine bird species due to proposed actions are unlikely to be significant.

Marine reptiles

The EIS identifies the following EPBC listed migratory marine reptiles as potentially present in the study area (according to database searches): green turtles (*Chelonia mydas*); loggerhead turtle (*Caretta caretta*); flatback turtle (*Natator depressus*); leatherback turtle (*Dermochelys coriacea*); hawksbill turtle (*Eretmochelys imbricata*); olive Ridley turtle (*Lepidochelys olivacea*); and estuarine crocodile (*Crocodylus porosus*).

Regarding the estuarine crocodile, the EIS reports that significant breeding populations do not occur south of the Tropic of Capricorn, and Port Curtis is not considered an important habitat. The EIS concludes that there is little likelihood of impacts to this species.

The EIS reports that The Narrows is a major foraging area for green turtles. The EIS anticipates direct impacts to seagrass meadows north of Fishermans Landing due to increased turbidity as a result of trenching activities, hence short-term impacts to marine turtles. Other direct impacts on turtles include impacts from boat strikes.

The EIS proposes mitigation measures such as turtle exclusion devices (dredge flanges), use of sediment limitation devices (silt curtains), reducing pump speed and boat speed, maintaining watch and reporting any interactions.

The EIS reports that it is unlikely that Port Curtis is an important habitat for hawksbill turtles, whilst the loggerhead and flatback turtle species occasionally move into The Narrows.¹³⁵ The EIS finds that the gas transmission pipeline crossing is unlikely to have a significant impact on hawksbill, loggerhead or flatback turtle species.

Marine mammals

The EIS identifies the following EPBC listed migratory marine mammals as potentially present in the study area (according to database searches): humpback whale (*Megaptera novaeangliae*); Bryde's whale (*Balaenoptera edeni*); killer whale (*Orcinus orca*); dugong (*dugong dugong*); Irrawaddy dolphin (*Orcaella brevirostris*); and Indo-Pacific humpback dolphin (*Sousa chinensis*).

The EIS reports that humpback whales are known to breed in the Great Barrier Reef region, however no humpback whales have been sighted within Port Curtis. Similarly, the Bryde's whale, killer whale and Irrawaddy dolphin are known to utilise the region, however none have been sighted within Port Curtis.

Regarding impacts on dugong due to trenching activities, the EIS reports that seagrass meadows adjacent to Friend Point are ephemeral and patchy, and dugong foraging behaviour may alter to forage on seagrass meadows of greater area and biomass at Pelican Banks and Targinie Banks. Proposed mitigation measures include use of silt curtains and avoiding construction during neap tides.

¹³⁴ Refer to EIS, G – EPBC Report, Section 6.

¹³⁵ Refer to EIS, G – EPBC Report, Section 6.

The EIS reports that boat strike poses the greatest threat to dolphins, including the Indo-Pacific humpback and Irrawaddy dolphin¹³⁶. Mitigation measures such as reducing boat speed and maintaining watch are proposed to reduce potential impacts.

The EIS concludes that impacts to marine mammals from pipeline trenching are considered to be negligible.¹³⁷

Sharks

The EIS identifies the EPBC listed whale shark (*Rhincodon typus*) as potentially present in the study area (according to database searches). However, the EIS finds that the species is uncommon in Queensland waters and unlikely to occur within Port Curtis, hence the EIS concludes that there is little likelihood of the pipeline marine crossing impacting this species.

10.7.3 LNG facility

World Heritage properties (EPBC Act section 12 and 15A)

The proposed LNG facility site on Curtis Island is situated within the GBRWHA.

I note that the EIS finds potential impacts to the World Heritage Area values are anticipated during construction and operational phases of the LNG facility. In particular the EIS finds that the greatest impact to World Heritage values is considered to occur to the *exceptional natural beauty and aesthetic importance* of Curtis Island and the GBRWHA (i.e. World Heritage value criterion VII) as a result of the following project impacts:

- the LNG facility would be visible from Port Curtis
- the LNG facility flare stack and flame would be visible to varying degrees
- the LNG train and storage tanks would be visible from Port Curtis and adjoining sections of Mount Larcom-Gladstone Road and the structures would be visible from Tide, Witt and Turtle Islands
- loss of vegetation from construction of the LNG facility.

The proponent's assessment of impacts and mitigation measures associated with other World Heritage criteria is provided in Table 2.1 in EIS EPBC Controlled Action Assessment Report. In addition to World Heritage criterion VII, the proponent has assessed impacts, and proposed mitigation measures, in relation to:

- criterion VIII (*significant geomorphic or physiographic features*)
- criterion IX (*significant ongoing ecological and biological processes*), and
- criterion X (*significant natural habitat for in-situ conservation of biological diversity*).

I note that potential impacts include those associated with earthmoving activities, vegetation disturbance, potential contamination activities, marine transport movement and other works within the GBRWHA. The EIS reports that impacts to saltmarsh/saltpan communities represent 0.11 per cent of saltmarsh/saltpan communities (presently totalling 4573 ha) and 0.006 per cent of mangrove communities (presently totalling 6736 ha) within Port Curtis. **I note** that the proponent proposes to mitigate soil and vegetation impacts through development and implementation of a construction Environmental Management Plan (proposed to include measures such as concentrating work in small areas, stockpiling soil away from drainage lines, minimising vegetation disturbance and proposed to include a Sediment and Erosion Control Plan) to minimise impacts on sub-tidal communities.

I note that the proponent proposes to minimise impacts to threatened and vulnerable marine reptiles and mammals (as a result of potential boat strikes whilst undertaking shipping and ferrying activities to and from the LNG facility) by reducing boat speed, maintaining watch and reporting any interactions.

I note that the EIS finds that potential impacts to the World Heritage Area values are also anticipated due to construction and operation of the gas flare stack and flame.

¹³⁶ The Snubfin dolphin (*Orcaella heinsohni*), is now considered to be a separate species from the Irrawaddy dolphin.

¹³⁷ Refer to EIS, G – EPBC Report, Section 6.



Further I note that the EIS reports that potential impacts to the World Heritage Area values as a result of greenhouse gas emissions from the LNG facility activities are anticipated to be negligible. **However, I note** that cumulative impacts to the World Heritage Area values as a result of associated with multiple LNG facilities on Curtis Island are not mentioned in the proponent’s EIS EPBC Act report.

National Heritage places (EPBC Act sections 15B and 15C)

The GBRWHA is also listed as a National Heritage Place, hence the proposed LNG facility is situated within a National Heritage Place. **I note** that the EIS finds that Port Curtis is listed on the Directory of Important Wetlands in Australia, due to its extensive range of marine wetlands encompassing seagrass beds, mangrove forest and intertidal mudflats providing habitat for a range of significant migratory water birds, reptiles and mammals.

The proponent’s assessment of impacts and proposed mitigation measures associated with Natural Heritage values is provided in Table 2.2 in the EIS EPBC Controlled Action Assessment Report. **I note** that the EIS reports the following in relation to potential impacts of the LNG facility on the outstanding heritage values of Port Curtis and Curtis Island:

Table 10.12 – Potential Impact of LNG Facility on National Heritage Places

Outstanding Heritage Values	Potential impacts	Proposed mitigation measures
The place has outstanding heritage value to the nation because of the place’s:		
Importance in the course or pattern of Australia’s natural cultural history	Impacts to vegetation will occur resulting in loss of mangroves, saltmarsh and intertidal communities	The vegetation disturbance footprint will be kept to a minimum.
Possession of uncommon, rare or endangered aspects of Australia’s natural or cultural history	Impacts to mangroves, saltmarsh and saltpan communities represent impacts to important breeding and nutrient supply areas for the maintenance of fish and crustacean populations.	The vegetation disturbance footprint will be kept to a minimum.
	Potential impacts to threatened and vulnerable species such as turtles and dugong.	Reducing boat speed, maintaining watch and reporting any interactions with threatened and vulnerable marine reptiles and mammals.
Potential to yield information that will contribute to an understanding of Australia’s natural or cultural history	Potential impacts on Curtis Island’s diversity of reef morphologies and ongoing geomorphic processes (such as parabolic sand dunes, cliffed coastlines, parallel beach ridges, salt pans, rock platforms, mudflats and marine plain) are not specified. However the accessibility of the Island for study purposes is noted.	No specific mitigation measures stated for this outstanding heritage value.
Importance in demonstrating the principal characteristics of: a class of Australia’s natural or cultural places; or a class of Australia’s natural or cultural environments	Potential impacts on Curtis Island as part of the GBRWHA, recognised for its significant expanse and diversity of coral reef formations.	The disturbance footprint will be kept to a minimum.

	The GBR is important for its cultural heritage for indigenous populations within Australia, in providing habitat for species used as a food source and for culturally significant events.	Site inspections of the proposed area will be conducted in consultation with traditional owners or archaeologists.
Importance in exhibiting particular aesthetic values by a community or cultural group	The LNG facility is unlikely to impact these values.	No specific mitigation measures stated for this outstanding heritage value.

Listed threatened species and communities (EPBC Act sections 18 and 18A)

Threatened ecological communities

I note that although the EIS found semi-evergreen vine thicket (Endangered) communities present on Curtis Island, the proponent has since advised that access road alignments have been re-designed to avoid this ecological community. Hence:

- The SEIS reports that vegetation within the project site has a long history of disturbance from grazing, thinning and exotic weed invasion.¹³⁸
- The SEIS reports that cumulative impacts from the construction of the LNG facility and its components will result in the disturbance of approximately 172 ha of remnant vegetation.¹³⁹ Of the five vegetation communities proposed to be cleared, one is considered representative of an 'endangered' regional ecosystem (RE) under the Queensland *Vegetation Management Act 1999* (VM Act) and one is classified as 'of concern' under the VM Act. The following table lists the REs proposed to be cleared at the LNG facility site.¹⁴⁰

Table 10.13 – Regional Ecosystems Potentially Impacted by LNG Facility

Regional ecosystem (RE)	Community description	VM Act status	Biodiversity status ¹⁴¹	EPBC Act status	Potential disturbance	
					Ha	Sub region ¹⁴² per cent
12.1.2	Saltpan vegetation comprising <i>Sporobolus virginicus</i> grassland and samphire herbland on Quaternary estuarine deposits	Not of Concern	No concern at Present	Not listed	0.6	0.004
12.1.3	Mangrove shrubland to low closed forest on Quaternary estuarine deposits	Not of Concern	No Concern at Present	Not listed	0.1	0.0006

¹³⁸ SEIS Attachment F – LNG Facility, F2 - Nature Conservation, Section 3.

¹³⁹ Source: SEIS Attachment F – LNG Facility, F2 - *Nature Conservation*.

¹⁴⁰ Refer to Table 2-1 in SEIS, Attachment F – LNG Facility, F2 - Nature Conservation.

¹⁴¹ Refers to Biodiversity status as recognised by the Queensland Department of the Environment and Resource Management.

¹⁴² Indicates disturbed per cent of vegetation community within the Burnett-Curtis Hills and Ranges province of the South-East Queensland Bioregion.



12.3.3	<i>Eucalyptus tereticornis</i> open forest to woodland on Cainozoic alluvial plains	Endangered	Endangered	Not listed	34.1	0.13
12.11.6	<i>Corymbia citriodora</i> and <i>Eucalyptus crebra</i> open forest to woodland on Mesozoic to Proterozoic metamorphosed sediments and interbedded volcanics	Not of Concern	No Concern at Present	Not Listed	104.5	0.006
12.11.14	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> grassy woodland on Mesozoic to Proterozoic moderately to strongly deformed and metamorphosed sediments and interbedded volcanics	Of Concern	Of Concern	Not Listed	32.8	0.71
Total					172.1	

The SEIS reports that overall cumulative impacts will include increased fragmentation of habitats and communities and edge effects.¹⁴³

Threatened species

Flora

I note that the SEIS finds that as a result of fauna and flora surveys carried out on Curtis Island (as summarised in EIS section 8 and EPBC Assessment Report), no EPBC listed species were observed.

Fauna

I note that the SEIS reports that impacts from individual components of the GLNG project will not significantly impact on the fauna assemblage; however, the cumulative impacts may have a greater impact on fauna. Overall impacts will include increased fragmentation of fauna habitats, dislocation of fauna movement corridors, increased use of and competition for adjacent fauna habitat areas, and possible mortality of common fauna species from clearing activities.¹⁴⁴

The SEIS reports that cumulative impacts to fauna will be low, given the relatively low diversity of terrestrial fauna determined from previous fauna surveys. The majority of conservation significant fauna species are birds and therefore their mobility allows them to move away from the zone of impact.¹⁴⁵

¹⁴³ Source: SEIS Attachment F – LNG Facility, F2 - *Nature Conservation*

¹⁴⁴ Source: SEIS Attachment F – LNG Facility, F2 - *Nature Conservation*

¹⁴⁵ Source: SEIS Attachment F – LNG Facility, F2 - *Nature Conservation*

Regarding potential for fragmentation and corridor loss, **I note** that the construction of the LNG facility site will reduce opportunities for fauna movement in the south-west corner of Curtis Island. Clearing for construction will lead to edge effects for vegetation communities adjacent to the project site.

I note that secondary impacts to fauna include disturbance from noise and vibration during facility construction and operations and minor impacts include disturbance from artificial lighting. Based on noise assessments undertaken as part of EIS studies, it is expected that construction and piling at the LNG facility site will potentially cause temporary disturbance to wetland and terrestrial birds. However, as alternative habitats are available elsewhere, an overall loss of avian diversity as a result of construction will probably not occur. Terrain and woodlands on the site are expected to reduce impacts to mammals (limiting dispersal) due to noise and vibration.¹⁴⁶

The SEIS reports that the potential introduction of exotic fauna, particularly Yellow crazy ants (*Anoplolepis gracilipes*) and fire ants (*Solenopsis invicta*) has the potential to seriously impact on native flora, fauna and ecological communities.

I note that the SEIS finds that as a result of fauna and flora surveys carried out on Curtis Island (as summarised in EIS section 8 and the EPBC Assessment Report), no EPBC listed species were observed. **However, I note** that the EPBC Act species considered most likely to be present within the LNG facility study area is the water mouse (*Xeromys myoides*, Vulnerable) which occurs in saline grassland, mangroves and margins of freshwater swamps. **I note** that the area of *Xeromys myoides* habitat to be potentially disturbed by LNG facility activities has not been presented as part of the proponent's environmental offset strategy, however, the proponent has subsequently advised that proposed offsets will cover water mouse habitat.

Listed migratory species (EPBC Act sections 20 and 20A)

I note that the EIS identifies thirty-three (33) protected migratory bird and other migratory marine fauna species as potentially being present within LNG facility study area.¹⁴⁷ **However, I note** that the EIS concludes that the area does not act as core habitat for any of these species as similar vegetation communities and topography can be found elsewhere in the region.

Migratory terrestrial birds

The EIS identifies the following EPBC listed migratory terrestrial bird species as potentially present in the LNG facility study area (according to database searches): White-bellied sea-eagle (*Haliaeetus leucogaster*); White-throated needletail (*Hirundapus caudacutus*); Barn swallow (*Hirundo rustica*); Rainbow bee-eater (*Merops ornatus*); Black-faced monarch (*Monarcha melanopsis*); Spectacled monarch (*Monarcha trivirgatus*); Satin flycatcher (*Myiagra cyanoleuca*); and Rufous fantail (*Rhipidura rufifrons*).

I note that the EIS reports that the rainbow bee-eater and satin flycatcher were recorded at the site, however the EIS concludes that impacts to these species are expected to be minimal as the area does not act as core habitat for either species, and the area does not offer suitable nesting sites for the rainbow bee-eater.

Similarly I note that for all other EPBC listed migratory terrestrial bird species identified as potentially present, the EIS concludes that area does not act as core habitat for any of these species, hence impacts on species are considered to be unlikely.

Migratory wetland birds

The EIS reports that migratory water bird surveys were undertaken in April, June and December 2008 (covering migratory and non-migratory periods, to ensure seasonality was considered).

The EIS identifies the following EPBC listed migratory wetland bird species as potentially present in the LNG facility study area: Great egret (*Ardea alba*); Cattle egret (*Ardea ibis*); Latham's snipe (*Gallinago hardwickii*); Australian cotton pygmy-goose (*Nettapus coromandelianus*); Little curlew (*Numenius minutus*); and Painted snipe (*Rostrattula benghalensis s. lat.*).

I note that the EIS concludes that those wetland migratory species that favour freshwater wetland habitats are unlikely to be reliant upon the two small water bodies present in the LNG facility study area.

¹⁴⁶ Refer to EIS Appendix N – Nature Conservation, N3 – LNG Facility (fauna), Section 4.

¹⁴⁷ Source: EPBC Referral for LNG facility.



I also note that the EIS finds that the three (3) listed migratory wetland/marine species reliant on marine wetlands are Latham's snipe (*Gallinago hardwickii*), little curlew (*Numenius minutus*) and little tern (*Sterna albifrons*).

However, I note that EIS finds that area does not act as core habitat for any of these species and the EIS concludes that overall the subject area is of relatively low significance in the context of the Australian Government's interests under the EPBC Act.

Migratory marine birds

The EIS reports that migratory water bird surveys were undertaken in April, June and December 2008 (covering migratory and non-migratory periods, to ensure seasonality was considered). Targeted surveys were undertaken at twelve (12) coastal sand/mudflat sites on the south-west coast of Curtis Island. Eleven (11) EPBC listed migratory wader or shorebird bird species were identified. Whilst few wader birds were observed at the study sites at low tide during the field survey, there was a high abundance and diversity of wader bird species observed foraging on sand/mud flats at low tide on the southeast of the island (approximately 9 km to the east of the study area).

The EIS identifies the following EPBC listed migratory marine bird species as potentially present in the LNG facility study area: Fox-tailed swift (*Apus pacificus*); Great egret (*Ardea alba*); Cattle egret (*Ardea ibis*); Southern giant-petrel (*Macronectes giganteus*); and Little tern (*Sterna albifrons*). Migratory shorebirds in the vicinity of the proposed LNG facility are described in detail within Section 3.4.3 of the Curtis Island LNG facility Fauna Survey report.

I note that the EIS concludes that area does not act as core habitat for any of these species.

Marine reptiles

The EIS identifies the following EPBC listed migratory marine reptiles as potentially present in the study area (according to database searches): green turtles (*Chelonia mydas*); loggerhead turtle (*Caretta caretta*); flatback turtle (*Natator depressus*); leatherback turtle (*Dermodochelys coriacea*); hawksbill turtle (*Eretmochelys imbricata*); olive Ridley turtle (*Lepidochelys olivacea*); and estuarine crocodile (*Crocodylus porosus*).

Regarding loggerhead turtles, green turtles and flatback turtles, the EIS concludes that due to the occasional nesting on the ocean side of southern Curtis Island and Facing Island, potential impacts to this species from the proposed LNG facility on the western side of the island are considered negligible.

Regarding the leatherback turtle (leathery turtle) and Olive Ridley turtle (Pacific Ridley turtle), the EIS reports that there are no records of occurrence of these species in Port Curtis, hence the EIS concludes the proposed LNG facility is unlikely to have a significant impact on these species.

Regarding the hawksbill turtle, the EIS reports that it is unlikely that Port Curtis is an important habitat for the species, hence the EIS concludes the proposed LNG facility is unlikely to have a significant impact on the species.

Regarding the estuarine crocodile, the EIS reports that significant breeding populations do not occur south of the Tropic of Capricorn, and Port Curtis is not considered an important habitat. The EIS concludes that there is little likelihood of impacts to this species.

I note that potential impacts to EPBC listed marine reptiles from increased shipping activities are proposed to be mitigated through reducing boat speed, maintaining watch and adhering to reporting requirements.

Marine mammals

The EIS identifies the following EPBC listed migratory marine mammals as potentially present in the study area (according to database searches): humpback whale (*Megaptera novaeangliae*); Bryde's whale (*Balaenoptera edeni*); killer whale (*Orcinus orca*); dugong (*dugong dugong*); Irrawaddy dolphin (*Orcaella brevirostris*); and Indo-Pacific humpback dolphin (*Sousa chinensis*).

The EIS reports that humpback whales are known to breed in the Great Barrier Reef region, however no humpback whales have been sighted within Port Curtis. Similarly, the Bryde's whale, killer whale, Irrawaddy dolphin and Indo-Pacific humpback dolphin are known to utilise the region, however none of these species have been sighted within Port Curtis.

Regarding impacts on dugong, the EIS finds that potential impacts may occur from increased numbers of ferries and barges used to transport materials, equipment and staff to and from the LNG facility.

I note that potential impacts to EPBC listed marine mammals from increased marine transportation activities are proposed to be mitigated through reducing boat speed, maintaining watch and adhering to reporting requirements.

Sharks

The EIS identifies the EPBC listed whale shark (*Rhincodon typus*) as potentially present in the study area (according to database searches). However, the EIS finds that as the LNG facility is above mean low water mark, there is little likelihood of the LNG facility impacting this species.

10.7.4 Marine facilities

The proponent's assessment of potential impacts and mitigation measures is provided in Section 3 of EIS Appendix G - *EPBC Controlled Action Assessment Report*.

I acknowledge that Gladstone is one of the largest commercial port facilities in Queensland.

Principal marine habitats in Port Curtis include: intertidal mudflats; mangroves; seagrasses beds; and coral communities.

The EPBC referral 2008/4058 relates to the construction of the projects marine facilities, including the product loading facility (PLF), materials off-loading facility (MOF), berthing pockets and channel dredging.

The EIS states that the MOF is to be constructed off Hamilton Point, and will be used to support onshore and offshore construction. The PLF will consist of a 300m long piled structure over the water, connecting the onshore plant to the offshore loading platform (for loading LNG onto ships), the marine operations platform and associated equipment and mooring infrastructure. The construction of MOF and PLF facilities will involve dredging in China Bay. A cutter suction dredge (CSD) is proposed to be used to carry out the dredging works required.

The EIS states that a channel extending from Targine Channel in Port Curtis to the PLF is proposed to be constructed; extending approximately 2 km long and 200 m wide, dredged to a depth of -13.5 m below lowest astronomical tide (LAT), and including a swing basin (dredged to the same depth) enabling ship manoeuvring. The area to be dredged approximates 125 hectares in total.

The EIS states that approximately 8 million m³ of material will require dredging for the access channel and swing basin to enable barge and ferry access to the MOF.

Regarding placement of dredged material, **I note** that EIS proposes dredged material be transported to a placement facility proposed to be constructed at Laird Point on Cutis Island (i.e. the Western Basin Dredging Disposal site). **I also note** that dredge placement at the Western Basin facility is proposed to be managed under a dredge management plan currently being developed by the Queensland Government and the Gladstone Ports Corporation, as part of the Western Basin Dredging and Disposal project and in accordance with the Western Basin Master Plan. **I note** that the proponent has put forward an alternative 'project-specific' plan and dredge placement facility south of Laird Point. **I do not support** the proponent's alternative 'project-specific' plan and dredge placement facility south of Laird Point, as **I note** the site has been acquired by another LNG proponent., and hence owners consent of the site is unlikely to be obtained.

It is assumed that the major channel dredging works required for the project are to be undertaken as part of the Western Basin Dredging project (WBD). The remaining components of the project affecting the marine environment are summarised as follows:

- permanent removal of marine plants within the footprint of the LNG plant and terminal
- dredging for the access channel to the materials offloading facility
- installation of the gas pipeline across the Narrows.

Impacts associated with these components would contribute, in a relatively minor sense, to the cumulative effects on the marine environment of Port Curtis when considering all the proposed dredging



and construction works. The most extensive of these include WBD, Fishermans Landing Port Expansion (FLPE) and Wiggins Island Coal Terminal (WICT) projects.¹⁴⁸

EIS states that approximately 8 million m³ of material will require dredging for the access channel and swing basin to enable barge and ferry access to the MOF. Information supplied in the EIS for the project indicates that construction of the marine facilities, including dredging for the MOF, would be undertaken in the initial stage of the project (2010/11). Accordingly this is unlikely to coincide with the peak dredging effort for WBD and FLPE which is scheduled over the period 2011-14.

The indicative impacts of a CSD dredging has been modelled in the EIS although the tailings water discharge from a disposal facility has not been included. In addition the simulation of the CSD in the model is located within the swing basin - some distance from the MOF dredging area. The model results show that a turbid plume would extend several kilometres from the works in accordance with the predominant tidal flows. The major effects (where elevated levels of suspended sediments exceed 25 mg/l) would be limited to an area approximately 250m either side of the dredge. Based on these simulations it can be inferred that the works would have potential for temporary impact on the shoreline of China Bay and the 34 ha of seagrass in the vicinity of South Passage Island. This area is also likely to be subsequently affected by the WBD works (in particular the dredging of the swing basin for the project) although the WBD project would have a greater spatial and temporal extent.

I note that potential environmental impacts due to dredging activities, including potential impacts on sensitive receptors in the Port Curtis area, and associated mitigation measures, is provided in SEIS, Attachment G9 - *Dredge Management Plan*.

The EIS includes an indicative impact assessment for the installation of the pipeline crossing of The Narrows. The modelling shows that plumes of elevated turbidity would extend into The Narrows past the northern tip of Kangaroo Island and also eastward into Graham Creek. The EIS indicates that low generation rates expected to be caused by the backhoe operations would result in only relatively low levels of elevated suspended sediment, less than 5 mg/l away from the works. Further information provided by a technical working group suggests that actual generation rates may be higher. Depending on the timing of the proposed works and the construction techniques employed, it can be expected that moderate adverse effects to the intertidal wetlands of Kangaroo Island and Graham Creek could occur. These areas are also likely to be affected by the WBD and FLPE works. Indicative construction schedules suggest the potential for co-incident timing of the pipeline crossing works with dredging/rehandling operations for the WBD project.

DERM has advised that insufficient information has been provided to accurately assess the impacts of the proposed pipeline crossing and the construction of marine facilities. In sections 8.4 and 9.1.3 of this report **I have required** that that proponent undertake further impact assessment of these matters prior to seeking approval of development permits for the works. Although further detail would be needed for statutory approvals, a conservative upper limit to the potential effects has been estimated to enable an appropriate offset to be determined for the cumulative impacts.

World Heritage properties (EPBC Act sections 12 and 15A)

The EIS reports that the proposed marine facilities within China Bay, Hamilton Point and Laird Point are within the Great Barrier Reef World Heritage Area (GBRWA).

The EIS reports that dredging activities will completely remove all benthic (bottom dwelling) substrate and fauna (e.g. worms, prawns) within the dredge sites; resulting in possible loss or displacement of those species directly dependent on these substrates and fauna, and hence resultant impacts on marine species higher in the food chain. However, the EIS reports that rates of recolonisation are expected to be high.

Potential impacts and mitigation measures in relation to World Heritage properties are summarised in Table 3.1 and Sections 3.3.2 and 3.4.1 of EIS Appendix G - *EPBC Controlled Action Assessment Report*. The proponent has assessed impacts, and proposed mitigation measures, in relation to the following World Heritage criteria:

¹⁴⁸ WBD is the subject of both CG and EPBC approvals, FLPE is subject to CG approvals only and WICT has been approved by both CG and EPBC.

- criterion VII (exceptional natural beauty and aesthetic importance)
- criterion VIII (significant geomorphic or physiographic features)
- criterion IX (significant ongoing ecological and biological processes), and
- criterion X (significant natural habitat for in-situ conservation of biological diversity).

I note the EIS concludes that due to the distance from the nearest significant coral reef communities (on and adjacent to Facing Island), increased turbidity from dredging activities is unlikely to impact them.

However, I note the EIS assessment of potential visual impacts from the marine facilities indicates that LNG carriers moored at the PLF, and marine transportation moored at the MOF, will be visible from Port Curtis and sections of the Mount Larcom-Gladstone Road.

I note the EIS concludes that the dredging activities will not impact the visual amenity of the World Heritage values. Further, **I note** that the EIS concludes that the impacts of the dredging will be limited to Port Curtis and that there will be no impacts to the Great Barrier Reef World Heritage Area.

National Heritage places (EPBC Act sections 15B and 15C)

The GBRWHA is also listed as a National Heritage Place, hence the proposed marine facilities are situated within a National Heritage Place.

I note that the EIS finds that Port Curtis is listed on the Directory of Important Wetlands in Australia, due to its extensive range of marine wetlands encompassing seagrass beds, mangrove forest and intertidal mudflats providing habitat for a range of significant migratory water birds, reptiles and mammals.

Potential impacts and mitigation measures in relation to National Heritage places are summarised in Table 3.1 and Sections 3.3.2 and 3.4.1 of EIS Appendix G - *EPBC Controlled Action Assessment Report*.

Listed threatened species and communities (EPBC Act sections 18 and 18A)

Potential impacts and mitigation measures in relation to EPBC listed threatened species and communities are summarised in Sections 3.3.3 and 3.4.2 of EIS Appendix G - *EPBC Controlled Action Assessment Report*.

Listed migratory species (EPBC Act sections 20 and 20A)

Potential impacts and mitigation measures in relation to EPBC listed migratory species are summarised in Sections 3.3.3 and 3.4.2 of EIS Appendix G - *EPBC Controlled Action Assessment Report*.

10.7.5 Bridge, road and services corridor

I am informed that the proponent does not intend to proceed with this component of the GLNG Project, hence **I have not provided** an evaluation of this component.

10.8 Environmental offsets

The proponent has provided an *Environmental Offset Strategy* (Ecofund, 3 March 2010)¹⁴⁹ and an *Environmental Offsets Proposal Summary Report* (April 2010)¹⁵⁰ including a summary of areas (in hectares) proposed to be offered to offset direct impacts to listed species and ecological communities under the EPBC Act, as follows:

¹⁴⁹ Refer to *Environmental Offsets Strategy for the GLNG Project*, prepared by Ecofund Queensland in conjunction with and based upon information provided by Santos, 3 March 2010.

¹⁵⁰ Refer to *GLNG Environmental Offsets Proposal Summary Report, April 2010*.



Table 10.14 - Proposed offset requirements for the gas fields

Listed species or ecological community	EPBC Act status	Habitat type	Proposed clearing area (ha)	Offset requirements (with ratio) [as presented by proponent]
Species				
Northern quoll	Endangered	Preferred habitat consists of rocky escarpments, open forest and open woodland	100.1	400.5 – 500.6 (4:1 – 5:1)
Large-eared pied bat, large pied bat	Vulnerable	Will forage in adjoining woodlands as well as clearings	108.1	270.3 – 378.4 (2.5:1 – 3.5:1)
Black-breasted button-quail	Vulnerable	Drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest	0.1	0.3 – 0.4 (2.5:1 – 3.5:1)
Red goshawk	Vulnerable	Eucalypt woodland, open forest, gallery rainforest, and rainforest margins	139.4	348.5 – 487.9 (2.5:1 – 3.5:1)
Australian painted snipe	Vulnerable	Potentially and wetland and farm dams with suitable vegetation cover	11.2	27.9 – 39.1 (2.5:1 – 3.5:1)
Brigalow scalyfoot	Vulnerable	Lives in brigalow/vine thicket regrowth but not tolerant of clearings	205.3	513.3 - 718.6 (2.5:1 – 3.5:1)
Collared delma	Vulnerable	Open eucalypt and Acacia woodland with sparse understory of shrubs and tussocks or semi-evergreen vine thicket	41.6	104 - 145.6 (2.5:1 – 3.5:1)
Squatter pigeon	Vulnerable	Grassy woodlands and open forest that are dominated by eucalypts	119.2	497.9 - 697 (2.5:1 – 3.5:1)
Ornamental snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) woodland growing on clay and sandy soils, riverside woodland, and open forest growing on natural levees	44	109.9-153.8 (2.5:1 – 3.5:1)
Yakka skink	Vulnerable	Open dry sclerophyll forest or woodland	119.9	299.7 - 419.6 (2.5:1 – 3.5:1)

Dunmall's snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) forest and woodland growing on cracking black clay and clay loam soils	205.3	513.3 - 718.6 (2.5:1 – 3.5:1)
Eastern long-eared bat	Vulnerable	River red gum forest, semi-arid woodlands and savannahs	275.4	688.6 - 964 (2.5:1 – 3.5:1)
Ecological community				
Brigalow ecological community	Endangered	Brigalow (<i>Acacia harpophylla</i>) dominant and co-dominant ecological communities	19.6	78.4 – 98 (4:1-5:1)
Semi-evergreen vine thicket	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nadewar Bioregions	0.8	3.2 - 4 (4:1-5:1)
Bluegrass ecological community	Endangered	Natural grasslands of the Queensland coastal highlands and the northern Fitzroy Basin	5.2	20.8 - 26 (4:1-5:1)

I note that the Environmental Offsets Strategy document states that ratios have been included in offset requirement estimates in recognition of: (a) the EPBC Act seeks offsets that are at least of equal quantity and quality; and (b) the *Draft Policy Statement: Use of environmental offsets under the Environment Protection and Biodiversity Conservation Act 1999 (Cth)* prefers offsets to be of greater quantity and/or higher quality. **Further I note** that the proponent and Ecofund Queensland have utilised the ratios contained in the Queensland *Draft Policy for Biodiversity Offsets 2008*, given no specific ratios are stated in the Australian Government draft policy.

I note that the Environmental Offset Strategy states that as species occur in similar habitats, offsets are proposed to be co-located.

I note that the calculations (presented on the table above) are based on direct impacts to EPBC Act listed threatened species and ecological communities. **However, I note** that the proponent's environmental offset strategy also presents offsets for threatened species and ecological communities under Queensland legislation and associated environmental offset policies, including under the: *Nature Conservation Act 1992*; *Vegetation Management Act 1999*; *Fisheries Act 1994*; and under the *Draft Policy for Biodiversity Offsets 2008* (Qld). **I state** that despite the GLNG project being exempt from the *Vegetation Management Act 1999* and that the *Policy for Biodiversity Offsets 2008* is in draft form **I require** offsets to be delivered at least to the extent that they are likely to be required by these proposed provisions, to give effect to the spirit of the government's policy. This is contained in my Condition 5, Appendix 2, Part 2.

I note that the EIS, SEIS and environmental offset strategy do not fully examine or nominate all areas of direct impact, and do not examine or nominate areas of indirect disturbances, including disturbances and impacts due to: edge effects; fragmentation and loss of connectivity; water treatment areas; creation of irrigation areas; greenhouse gas emissions; and potential reduction of ground water table levels within the gas field s. **I require** that estimates for these impacts also be presented.

Further I note that the areas nominated by the proponent to be cleared and offset (as presented in the above table) are based on the proponent's 'Reasonable Worst-Case' scenario (multiple drill holes from one drill pad). **I note** that DEWHA has advised that it is more appropriate that the actual worst case 'Pre-Avoidance and Mitigation' (i.e. one well hole per drill pad) scenario is presented. **I have required** that



clearing of vegetation species and ecological communities and habitats be limited to the 'Reasonable Worst-Case' scenario.

I note that the gas field vegetation clearing estimates are only based on the forecasted Field Development Plan (FDP), a sub-component within the proponent's Reasonable Foreseeable Development Area (RFDA). **Further I note** that the FDP has not been provided by the proponent as part of the EIS, hence the area of the FDP, locations of proposed wells, pipelines and associated infrastructure have not been provided, and are hence **unknown to me** at the time of writing of this report. **However, I am aware** that the EIS states the RFDA is within the Arcadia valley, Fairview and Roma gas fields and covers approximately 1.3 million ha.

I note that the FDP clearing estimates are based on the proponent's environmental constraints-based mapping and a field management protocol approach outlined in SEIS Attachment D5 – Nature Conservation (refer to Part 2 -*Environmental Constraints Mapping and Field Management Protocols*).

I also note that it is the proponent's intention that the FDP will change incrementally over the life of the project. In this regard, **I note** the methodology proposed in the environmental offset strategy: it is proposed that the proponent secure offsets at the beginning of the project, and as the gas field development progresses, and that the amount of clearing will be monitored and reported at the end of each 5 year period. **However, I consider** that it is more appropriate that the frequency of monitoring be at least annual, and that reporting requirements should match timeframes for other reporting requirements (such as annual returns and audit reports) and planning periods (submission of operational plans), keeping all documents and regulatory authorities updated regarding the status of disturbance, rehabilitation and offsets for the project.

Following consideration of all the above, **I find** that the areas nominated by the proponent to be cleared and offset (as presented in the environmental offset strategy) represent only a small fraction of the extensive land, vegetation and watercourse disturbance likely to result from project activities in the gas fields. **I consider** that the areas proposed to be offset generally reflect direct disturbances to areas of remnant¹⁵¹ vegetation, whereas the proposed disturbances to extensive areas of other vegetation, including non-remnant (or regrowth)¹⁵² vegetation and riparian areas which offer biodiversity, ecosystem functionality and other conservation values, have not been adequately considered nor appropriately offset. **Therefore I will consider** in the process of assessing operational plans whether a proportion of the extensive land, vegetation and watercourse disturbances (i.e. including riparian areas and non-remnant or regrowth vegetation) should also be presented as an offset, in addition to other, traditional, offset requirements outlined above.

I require an initial offset package to be provided to the Coordinator-General and DERM within 6 months of: the issue of any gas field environmental authorities (pursuant to the EP Act); or amendment of any existing gas field environmental authorities, relating to proposed GLNG activities. **I require** that the offset package be based on information obtained from "ground truthing" of endangered ecosystems and other vegetation proposed to be disturbed under the new or amended environmental authority. **I require** that the extent of existing project disturbance (on the petroleum tenement areas the subject of the environmental authority) and the status of the operational plan (including progress and status of rehabilitation) should be provided at the time of submission of the offset package.

I require that each operational plan provide a detailed disturbance and rehabilitation summary that includes: (a) a current account (audit at commencement of operational plan period) of disturbance and rehabilitation; (b) a planning period proposal (for the duration of the operational plan) of disturbance and rehabilitation; and (c) a reconciliation (actual, third-party audited account at the end of the operational plan period) of disturbance and rehabilitation areas. **I require** that the disturbance and rehabilitation information provided contain both qualitative and quantitative in its description of vegetation and use category descriptions that are inclusive and consistent with Australian Government EPBC Act legislation

¹⁵¹ "Remnant vegetation" is defined in the *Vegetation Management Act 1999* (Qld) as vegetation, part of which forms the predominant canopy of the vegetation: covering more than 50 per cent of the undisturbed predominant canopy; averaging more than 70 per cent of the vegetation's undisturbed height; and composed of species characteristic of the vegetation's undisturbed predominant canopy.

¹⁵² Vegetation is termed "non-remnant" or "regrowth" until it reaches the threshold to be classified as "remnant vegetation" as defined in the *Vegetation Management Act 1999* (Qld).

(i.e. EPBC listed communities and species habitat) and Queensland legislation and policy (e.g. areas described include Category A, B and C environmentally sensitive areas).

I require that cumulative actual (third-party audit reconciled) vegetation disturbance and rehabilitation information (qualitative and quantitative, using category descriptions as required to be presented in the operational plan), be published, permanently maintained and updated on the proponent's website for the duration of the GLNG project. **In addition I require** that a list of environmental offsets (accepted and in place) for all reconciled vegetation disturbances is simultaneously presented (with the reconciled vegetation disturbance information) and the listed offsets are clearly described (qualitatively and quantitatively), and permanently maintained and updated on the proponent's website for the duration of the GLNG project.

I require that reconciled vegetation disturbance and rehabilitation information (qualitative and quantitative) is updated at least annually by the proponent.

I require the proponent to facilitate the undertaking of a third-party audit of actual vegetation disturbance and rehabilitation disturbance one (1) month prior to the first annual anniversary of date of approval of each operational plan.

I require a report of actual (third-party audit reconciled) vegetation disturbance and rehabilitation information to be submitted to the Coordinator-General, and the relevant Queensland and Australian Government environment administering authorities for the project (DERM and DEWHA) on the first annual anniversary of date of approval of each operational plan.

I also require a report of actual (third-party audit reconciled) vegetation disturbance and rehabilitation information to be submitted to the Coordinator-General, and the relevant State and Australian Government environment administering authorities for the project (DERM and DEWHA) at the end of each operational plan period, and prior to commencement of a new operational plan period.

I condition that the State of Queensland reserves right to require further environmental offsets be supplied by the proponent (environmental authority holder) for the GLNG project following the regulator evaluation of actual (third-party audit reconciled) vegetation disturbance and rehabilitation information for the project and/or upon receipt and acceptance of, or prior to commencement of, a new operational plan.

For offset conditions for the gas field, refer to Condition 4 Appendix 2 Part 2, in this Coordinator-General report.

Gas transmission pipeline

In relation to the gas transmission pipeline, **I note** that the proponent's environmental offset strategy proposes to offset direct impacts to listed species and ecological communities under the EPBC Act, as follows:

Table 10.15 - Clearing and Offset requirements of gas pipeline

Listed species or ecological community	EPBC Act status	Habitat type	Proposed Clearing Area (ha)	Offset Requirements (with ratio as presented by proponent)
Species				
Squatter Pigeon	Vulnerable	Grassy woodlands and open forests that are dominated by eucalypts	5.6	14 - 19.6 (2.5:1 – 3.5:1)



Cycas	Endangered	Woodland, open woodland and open forests, with a grassy understory	27.8 (Individual plants = 665 + 1,085) ¹⁵³	111.2 - 139 (4:1-5:1)
Sub total			33.4	125.2 – 158.6
Ecological community				
Brigalow ecological community	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) ecological communities	4.7	18.8-23.5 (4:1-5:1)
Weeping myall woodland	Endangered	<i>Eucalyptus populnea</i> woodland on alluvial plains	4.5	18 - 22.5 (4:1-5:1)
Semi-evergreen vine thicket	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nadewar Bioregions	2.41	9.6 - 12 (4:1-5:1)
Sub total			11.61	46.4 - 58
Total			45.01	171.6 – 216.6

I note that the EIS, SEIS and environmental offset strategy do not nominate areas of indirect disturbances and impacts to EPBC listed species and communities associated with edge effects and fragmentation and loss of connectivity of ecosystems and habitats that are likely to be associated with construction of the gas transmission pipeline. **I state** that despite the GLNG project being exempt from the *Vegetation Management Act* 1999 and that the *Policy for Biodiversity Offsets* 2008 is in draft form **I require** offsets to be delivered at least to the extent at they are likely to be required by these proposed provisions.

For offset conditions for the gas transmission pipeline, refer to Appendix 4, Condition 12 in this Coordinator-General report.

LNG facility

Regarding the LNG facility, **I note** that no environmental offsets are proposed in relation to EPBC Act matters, as the SEIS concludes that there will be no significant impacts to listed ecological communities and species habitat resulting from LNG facility activities. Refer to section 4.1 in the proponent's environmental offset strategy

For offset conditions for the LNG facility, refer to Condition 4 Appendix 2 – Part 1, in this Coordinator-General Report.

Marine facilities

Regarding the marine facilities, **I similarly note** that no environmental offsets are proposed in relation to EPBC Act matters. Refer to section 4.1 in the proponent's environmental offset strategy.

A strategic offset proposal has been prepared by GPC to mitigate the residual impacts of the WBD, FLPE and WICT. **I am currently considering** this proposal as part of my assessment of the WBD and FLPE projects which, due to their combined nature and scale, are likely to cause the majority of the overall

¹⁵³ The proponent's Environmental Offset Strategy reports that these figures for *Cycas megacarpa* are for the proposed clearing along the gas transmission pipeline baseline alignment option – Option 1. The 665 individual *Cycas megacarpa* plants are stated to be within the alignment and the 1,085 plants are adjacent to the alignment. The Callide Range Alternative Route Option identified 3 *Cycas megacarpa*.

impacts on water quality in Port Curtis. Given the cumulative nature of these temporary impacts caused by these various activities, all relevant projects are to be considered together taking into account the additive effects both spatially and temporally. Accordingly, **I have extended** the scope of the strategic offset package to include the temporary impacts of the proposed construction of marine facilities on Curtis Island and the installation of a bundled pipeline crossing of The Narrows. This will be finalised in my evaluation of the WBD project.

At minimum this strategic offset package to be presented for the whole of the Western Basin Dredging project for all LNG participants will include:

- the protection in perpetuity of an area of 5000 ha of coastal land at Port Alma currently within GPC's Strategic Port Land (SPL)
- contribution of \$5 million to DEEDI (Fisheries Queensland) to support future research or studies which have practical and tangible outcomes for fisheries habitat and productivity within the region.
- the permanent loss of marine plants within the project footprint are a distinctly separate impact and are not considered in the strategic offset package.

Offset property selection

Regarding property selection, **I recommend** that the 'strategic' approach outlined in the environmental offset strategy be pursued in favour of the 'traditional' approach. That is, **I require** the securing of larger, more viable and strategically located areas which deliver significant conservation outcomes (high biodiversity values) while contributing to the long-term expansion of protected areas (and possibly National Park) in Queensland.

I require that environmental offsets are to be secured by the proponent, in a manner that achieves a "no net loss" of biodiversity outcome, and in a manner and timeframe acceptable to DERM. **I require** that an environmental offsets program, consistent with the *Queensland Government Environmental Offsets Policy 2008* (QGEOP) must be provided for approval prior to issue of environmental authorities for GLNG petroleum activities.

The proponent has offered, through Ecofund Queensland, offset packages in accordance with State and Australian Government policies using both 'traditional', being smaller scattered areas offsetting individual values on a case by case basis and a 'strategic approach', being larger, self-sustaining tracts.

The 'strategic' approach to offset identification enables selection of land that can be secured and managed to improve connectivity in the landscape, reduce edge effects and provide significant conservation outcomes for threatened vegetation communities and species. The strategic approach may present opportunities for land to be acquired and transferred to the Queensland Government as a protected area.

I note that the proponent has recently submitted¹⁵⁴ an offset proposal titled *GLNG Environmental Offsets Proposal Summary Report, April 2010*. **I note** that the proposal contains a brief outline of the offset package, nominating up to five (5) properties to directly offset potential impacts to listed species and communities, and indirect offsets for potential impacts on World Heritage values. The proponent has advised that key ecological communities such as Brigalow, Weeping Myall Woodlands and Natural Grasslands will be offset by the offset package. The range of proposed indirect offsets are outlined below. The proposal describes offset property values, as assessed by the proponent, and describes the proposed steps to evaluate and secure the proposed offset properties. The proponent states that their environmental offset package meets the objectives of both Queensland and Australian Government offset policies, and in most cases the proposed offset areas are many times greater than the original impact areas. **However, I note** that the offset proposal has not been assessed nor evaluated as part of this Coordinator-General report.

¹⁵⁴ Via email from proponent, received 4 May 2010.



I note that the following proposed indirect offsets in relation to potential impacts on World Heritage values are outlined in the abovementioned Environmental Offsets Proposal Summary Report:

- A proposal up to maximum of \$500,000 to indirectly offset potential impacts on marine and associated World Heritage values in Port Curtis by funding research into fisheries and seagrass impact mitigation
- A proposal up to a maximum of \$340,000 to indirectly offset and support mitigation for potential marine and associated World Heritage impacts by funding an indigenous QPWS range for a four year period.
- A proposal up to a maximum of \$300,000 to fund a QPWS research vessel to assist with improved management of the GBRMO
- A proposal up to a maximum of \$250,000 to indirectly offset impacts to threatened flora species from construction of the gas transmission pipeline, by funding recovery plan research into species life history and translocation/propagation viability.

In addition **I note** that a significant portion of land (4950 ha) within the Gladstone State Development Area on Curtis Island has been designated an environmental management precinct, to provide a buffer for the adjacent LNG activities. The Queensland Government is requiring Curtis Island LNG proponents to provide financial contributions to assist with the management of the environmental management precinct, **I note** that the proponent has requested that this contribution be considered as an offset in relation to potential impacts on World Heritage values.

10.9 Agency advice

The following summarises DEWHA's comments regarding the SEIS, and the corresponding response by the proponent.

10.9.1 Gas fields—proponent's constraints classes and EPBC species habitat

DEWHA have advised that the constraints classes presented by the proponent (SEIS Attachment D5, Part 1, Sections 1-1.4) refer to State identified habitat areas but do not appear to incorporate Australian Government species habitat areas (i.e. as listed under the EPBC Act).

DEWHA have subsequently discussed the field development uncertainty with the proponent and the Queensland Government. DEWHA's suggested approach is to strengthen the proponent's 'constraints mapping' to identify EPBC environmentally sensitive areas, and develop the proponent's field management protocols as a reportable and auditable approach.

A reportable and auditable approach would record avoidance decisions, impact mitigation decisions, and decisions leading to direct or indirect impacts.

The field management protocols would also include the collection of survey data on MNES and its provision to relevant government agencies to inform future assessments and decisions.

The suggested approach would provide a robust self-regulated protocol for NES matter identification, avoidance/mitigation, and reporting that can be monitored from its inception, and if necessary adjusted over the estimated 25 year project timeframe.

The suggested approach would facilitate accurate accounting and review of the initial offset package as the gas fields are developed. It could also include triggers to require additional offsets if the initial 'offset package' does not provide for the actual offsetting requirements. Alternatively, the proponent would need to refer additional field development to the Australian Government for a controlled action decision and potential assessment under the EPBC Act.

Proponent's response

The proponent has responded that constraints classes incorporate a range of mapped environmentally sensitive areas that include both EPBC listed communities and State listed communities¹⁵⁵, and the constraints classes approach encompass the values of EPBC listed species and communities.

Specifically, the constraints classes approach¹⁵⁶ utilises State regional ecosystem data as a surrogate for EPBC listed communities to indicate the extent of values associated with MNES communities and species habitat. State regional ecosystem data has been applied because it is the most rigorous and reliable data available. There is no existing mapping for discrete extents of EPBC listed communities or species habitat, in fact present mapping only indicates range and distribution, not potential areal extent.

The proponent advises that EPBC listed fauna species habitat mapping has been developed and presented as a complementary data set to the constraints mapping.¹⁵⁷ The level of scientific reliability of potential EPBC listed species mapping is not comparable to the layers used in the constraints mapping, which have been developed by conservation departments over years and in some cases decades.¹⁵⁸

The proponent asserts that the rigor provided in the constraints mapping layers, and developed in the field management protocols, is such that management of EPBC listed species, including targeted searches and mitigation, will be triggered wherever potentially impacted habitat is present within the Gas field s, based on the more accurate values provided by the constraints mapping.

10.9.2 Gas fields—proponent's field protocols and EPBC species habitat

DEWHA have advised that the proponent's field protocols (SEIS Attachment D5, Part 1, Section 1.5) relate to the proponent's constraints classes which do not include EPBC fauna habitat. DEWHA require that the field protocols relating to EPBC fauna habitat be clarified.

Proponent's response

The protocols associated with EPBC fauna habitat¹⁵⁹ (EIS Supplement Attachment D5, Part 3, Section 3.1.1) are the same as the generic protocols triggered for all management classes of the constraints mapping to ensure that protocols are complementary, and one series of maps does not trigger a management protocol in contradiction to the other.

The proponent reiterates the abovementioned response regarding use of State regional ecosystem data and limitations of EPBC species mapping. The proponent reiterates that constraints mapping encompasses the same values of EPBC listed species habitat and listed communities, but at a more accurate level.

Protocols dictate that if a remnant extent of vegetation or fauna habitat will potentially be impacted, further investigation is required to be undertaken to determine if significant values are present (whether they be state or EPBC listed species or communities).¹⁶⁰ The proponent asserts that the rigor provided in the protocols and constraints mapping¹⁶¹ is such that management of EPBC species, including targeted searches and mitigation for EPBC fauna species and habitat, will be triggered wherever potentially impacted habitat is present within the CSG fields.

The proponent considers that inclusion of the EPBC species fauna habitat layers with the constraints mapping would lower the integrity of the constraints mapping and value of the associated specific field mitigation protocols, due to the relative reliability and broad nature of the data and predicted habitat extents of the fauna mapping layers.

¹⁵⁵ The proponent refers to Part 1 Section 1.4, Part 2 Section 1.3 and 1.3.3 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁵⁶ The proponent refers to Part 2, Section 1.3.3, Table 1-4 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁵⁷ The proponent refers to Part 3 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁵⁸ The proponent refers to Part 3, Section 1.2.5 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁵⁹ The proponent refers to Part 3, Section 3.1.1 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁶⁰ The proponent refers to Part 2, Section 3.2.2 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁶¹ The proponent refers to Part 2 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.



The proponent highlights that the developed EPBC species mapping is a useful tool for offset estimation, desktop planning, as an indicator of potential values for field based scouting, and as a trigger for high level mitigation protocols/actions.

10.9.3 Gas fields—proponent’s constraints classes, EPBC listed communities and species

DEWHA advises that environmentally sensitive areas are classified in the proponent’s constraints classes according to Queensland legislation (in SEIS Attachment D5, Part 2, Section 1.3.1). DEWHA require that EPBC listed communities and flora and fauna should be explicitly listed in the appropriate category.

Proponent’s response

The proponent highlights that the “Class B” constraints¹⁶² include EPBC listed communities.

The proponent reiterates the abovementioned response regarding use of State regional ecosystem data and limitations of EPBC species mapping (including lack of data and uncertainty regarding typical habitats). The proponent reiterates that the potential for EPBC flora species has been captured by field management protocols in the pre-construction survey stage, where a qualified person is required to assess the likelihood of such species being present and undertake targeted surveys as required.¹⁶³

10.9.4 Gas fields—surveys

DEWHA advises that tertiary sites are omitted from the proponent’s proposed flora field survey methodology (SEIS Attachment D5, Appendices, Part 2 – Appendix B – *Field Survey Methodology*, pp. 74).

Proponent’s response

The proponent has responded that the use of a combination of secondary and quaternary survey sites (with the exclusion of tertiary sites) is an acceptable methodology for this type of survey. The proponent states that the use of tertiary sites for the type of targeted searches required is too low a level of rigor and may not capture the level of discrete data required to identify significant values for EPBC species and habitat.

The proponent considers that some flexibility should be considered in the development of applicable field methodology. The proponent states that the methodology proposed in the SEIS¹⁶⁴ is provided as a guide and as a suggested starting point for the development of a more applicable field method suited to specific field conditions if appropriate.

10.9.5 Gas fields—worst case disturbance

DEWHA advises that the ‘Reasonable Worst Case’ scenario, as presented by the proponent (in EIS Attachment D5, Part 1, Sections 1-1.7), is based on using multiple drill holes from one drill pad. However, DEWHA does not regard this as a worst case, as multiple-well drill pad technology may not be applied in all cases (i.e. vertical drilling will also be utilised). DEWHA considers that it is more appropriate that the ‘Pre-Avoidance and Mitigation’ scenario be presented as the ‘worst case’.

Proponent’s response

The proponent has responded that the SEIS¹⁶⁵ estimated the potential impacts on environmental values within the Gas field based on the development of a preliminary Field Development Plan (FDP) overlain over specific environmental constraint layers including both State and Australian Government interests.

¹⁶² Refer to Part 2, Section 2.1.2 in SEIS, Attachment D5 – CGS Fields - Nature Conservation.

¹⁶³ The proponent refers to Part 2, Section 3.2.2 in SEIS, Attachment D5– CGS Fields - Nature Conservation.

¹⁶⁴ Refer to Attachment D5 – CGS Fields - Nature Conservation, Appendices: Part 2 – Environmental constraints mapping and field management protocols, Appendix B – Field survey methodology.

¹⁶⁵ The proponent refers to Part 4, Impact Analysis and Offsets Strategy in SEIS, Attachment D5 – CGS Fields - Nature Conservation .

The FDP was developed for the Reasonably Foreseeable Development Area and covered the full development of the gas fields for the life of the GLNG Project.

The report presented three scenarios based on the preliminary FDP, the adoption of specific drilling technologies and the implementation of specific Field Management Protocols (FMPs) including detailed site assessments prior to clearing occurring.

The 'Pre-Avoidance and Mitigation' scenario represents a field layout that was developed based on well bottom locations within the coal measures and the construction of a single vertical well and associated field infrastructure. According to the proponent, the scenario is indicative only and represents a geological representation of the best option to develop the gas reservoirs. According to the proponent, the scenario was used to provide an appreciation of the field layout without the adoption of best environmental management or specific EMPs.

The proponent states that in the (unlikely) event that only vertical drilling was used for the entire field development, the reduction in impacts would be up to 30 per cent or more, as many sites would not be accessible due to difficult terrain or the inability to gain access to certain environmentally sensitive areas. The proponent predicts that the adoption of field management protocols, which includes the adoption of environmental best practice as outlined in the SEIS, would further significantly reduce potential impacts.

The proponent anticipates that approximately 90 per cent of all future wells will be drilled using multi-well pads. This may be a combination of existing development wells, new development wells and additional infill wells for accelerated production.

10.9.6 Gas fields—assessment of project specific impacts on matters of NES

DEWHA has expressed that the SEIS (Attachment D5, Part 3, Section 2.1.2) does not evaluate the potential impacts from the proposed action on MNES from the proposed action. DEWHA advises that general threats are mentioned only, rather than project specific threats.

Proponent's response

The proponent has responded that impact assessment and project specific threats are presented in the SEIS Attachment D5, Part 4, Section 2 (including sections 2.1.2 and 2.3).

10.9.7 Gas fields—assessment of project specific impacts on migratory species

DEWHA has expressed that the SEIS (Attachment D5, Part 3, section 2.1.4) does not evaluate the potential impacts from the proposed action on migratory species.

Proponent's response

The proponent reiterates that impact assessment and project specific threats are presented in the SEIS Attachment D5, Part 4, Section 2 (including sections 2.1.2 and 2.3). Further, the proponent has responded that the likelihood of impacts to migratory species is presented in EIS, Appendix G - *EPBC Controlled Action Assessment Report*.

10.9.8 Gas fields—prevention of fauna mortality

DEWHA advise that the nature of the management measures that will be used by the proponent to prevent fauna mortality should be indicated to enable evaluation of the adequacy of those measures.¹⁶⁶

Proponent's response

The proponent has responded that specific fauna mitigation management measures are detailed at length within the Environmental Management Plans submitted for the gas fields and gas transmission pipeline.

¹⁶⁶ DEWHA refers to SEIS Attachment D5, Part 4, Section 2.3.4.



10.9.9 LNG facility—EPBC listed species and communities— specify, describe and survey

DEWHA has stated that there remains a need for the proponent to specify and describe EPBC listed flora and/or threatened ecological communities for the GLNG project. DEWHA require that EPBC listed species and communities be included in flora and fauna surveys.

Proponent's response

The proponent has responded by reiterating that the EPBC listed communities and flora species have not been neglected in the EIS and SEIS, and are captured in a variety of assessment processes/mechanisms.

10.9.10 LNG facility—EPBC listed species and communities— Environmental values

DEWHA advises that the proponent has not included EPBC listed endangered communities or listed threatened species in the environmental values section (Section 2.1) of SEIS, Attachment F – LNG Facility, F2 - *Nature Conservation*.

Proponent's response

The proponent has responded that no listed endangered species were identified as occurring, or potentially occurring, within the LNG facility disturbance area footprint, as described in the baseline results.

The proponent advises that no EPBC listed communities were identified among vegetation communities surveyed within the LNG facility disturbance area footprint. Communities impacted within the LNG facility disturbance area footprint are identified in SEIS Attachment F - LNG Facility, F2 - *Nature Conservation*, Table 2.1.

10.9.11 LNG facility—EPBC listed species and communities— Potential impacts and mitigation

DEWHA note that RE 12.2.2 (which is critically endangered under the EPBC Act) is mentioned in the cumulative impacts section, but not specified elsewhere.

Regarding mitigation measures, DEWHA has stated that there is no mention of the EPBC listed endangered communities or listed threatened species in the potential impacts and mitigation measures section (Section 3.1) of SEIS, Attachment F – LNG Facility, F2 - *Nature Conservation*. DEWHA consider that the EPBC listed communities should be protected during clearing in their vicinity (similar to state classified regional ecosystems).

Proponent's response

The proponent has responded that the LNG facility footprint was revised as part of preparation of the Supplementary EIS, and now avoids disturbance to RE 12.2.2 (a vegetation community of microphyll / notophyll vine forest on the beach ridges).

With regards to mitigation measures, the proponent has responded that Section 3.2.2 states that areas to be cleared will be delineated prior to the commencement of clearing, and that all clearing in proximity to 'Endangered' REs (including RE 12.2.2) will be supervised by a qualified ecologist.

10.9.12 LNG facility—EM plan and EPBC listed flora species

DEWHA consider that the terrestrial flora section of the EM plan submitted for the LNG facility should include EPBC listed flora species.

Proponent's response

The proponent states it has determined that there are no EPBC listed flora species identified as occurring, or potentially occurring, within the LNG facility area.

10.9.13 LNG facility—EM plan and EPBC listed fauna species

DEWHA consider that the terrestrial fauna section of the EM plan submitted for the LNG facility should include EPBC listed fauna species.

Proponent's response

The proponent states it has determined that there are no EPBC listed fauna species identified as occurring, or potentially occurring, within the habitat of the LNG facility area.

Further, the proponent advises that five EPBC listed migratory species were identified¹⁶⁷ as potentially utilising wader bird habitat in the locality of the LNG facility, however targeted studies have found that habitat for these species is marginal. Impact analysis in the EIS and SEIS describe that no foreseeable impacts to these species, hence no mitigation measures are proposed in the EM plan.

10.9.14 LNG facility—EM plan and marine transport movement impacts

DEWHA advise that the enforcement of speed limits is an important method to avoid boat strike of listed marine species. DEWHA note that this is not mentioned in the EM plan for the LNG facility.

Proponent's response

The proponent confirms that risks involved with marine transport include injury to marine mammals and turtles. The proponent considers that fast moving planing vessels such as water taxis and recreational vessels pose the greatest threat for vessel strike to dugong and turtles due to a reduction in the time available to escape from oncoming vessels.

The proponent has identified that the *Transport Operations (Marine Safety) Regulation 2004 (Qld)*¹⁶⁸ applies a speed limit of six knots to ships within 30 metres of a jetty, wharf, boat ramp or pontoon in or on the waters, or within 30 metres of a ship at anchor or made fast to the shore. However, the proponent notes that there are no other speed restrictions specified for Port Curtis.

The proponent has expressed a commitment to work cooperatively with the Gladstone Ports Corporation and other users of Port Curtis to determine if speed restrictions are required for the high-speed vessels proposed to be used to ferry GLNG personnel from the mainland to Curtis Island.

The proponent has expressed a commitment that in the event that a dugong or turtle is in the vessel path, the proponent's vessels will take all measures to avoid impact.

10.9.15 LNG facility—Acid sulfate soils management

DEWHA requires specific details regarding acid sulfate soil (ASS) disturbance at the LNG facility site. In particular, with regards to the proponent's statement that '*Disturbance of ASS on the facility site itself is deemed to be minimal and is avoided to all extents practicable*', DEWHA requires specific information to: determine that the proposed disturbance of ASS is minimal; and clarify the proponent's commitment regarding avoiding ASS disturbance to '*all extents practicable*'.

Further, DEWHA notes that an ASS management plan will be developed by the proponent based on the recommendations in SEIS Attachment G2 – *Acid Sulfate Soils*. DEWHA require further elaboration of proposed mitigation measures for ASS.

¹⁶⁷ In studied undertaken by URS for the GLNG Project and QCLNG Project.

¹⁶⁸ Refer to Sections 127, 128 and 129 of the *Transport Operations (Marine Safety) Regulation 2004*.



Proponent's response

The proponent has responded that an ASS management plan will be prepared prior to construction of the LNG facility. The plan will describe additional surveys and specific management measures for areas where it is determined that potential for ASS exists.

Further, the proponent has reiterated that the project's EM Plans will be reviewed and revised to address DEWHA's submission and will be provided as supporting documentation for the environmental authority applications under the *Environmental Protection Act 1994* (Queensland).

10.9.16 LNG facility—Flaring impacts on EPBC listed species (marine turtles)

Regarding potential for impacts on loggerhead and Green turtles, DEWHA requires the proponent to avoid non-emergency flaring during breeding and hatching season (i.e. November to January), as this is a key time in the life cycle of these species. DEWHA requires the proponent to document commitments in this regard.

DEWHA has expressed an understanding that emergency flaring will not necessarily be avoidable during this period.

Proponent's response

The proponent advises that an assessment to determine whether there is a direct line of sight (and hence impact the turtle species) from the gas stacks (99m in height) and emergency flare (179m in height) at the LNG facility to the location of turtle nesting beaches, indicates there is a direct line of sight and hence potential for impact to turtles frequenting beaches at the southern end of Curtis Island.

The proponent has expressed a commitment that all night time scheduled maintenance flaring will be undertaken outside of the turtle nesting season (i.e. November to January). Further, in the event that emergency or unscheduled maintenance flaring occurs during loggerhead and green turtle nesting season, the proponent will initiate a monitoring program to assess potential impacts to nesting turtles and hatchlings as detailed in the *Turtle and Dugong Management Plan* (provided in SEIS Attachment F5).

10.9.17 LNG facility—Marine ecology mitigation measures

Methodology

DEWHA advises that there is scant and very generalised treatment of any mitigation actions within SEIS Attachment F – *LNG Facility, F5 – Marine Ecology*. DEWHA refers to the following statement as an example; 'mitigating actions, such as best practice methodologies will be used to remove mangroves and saltmarsh to be potentially impacted by construction activities'. DEWHA highlights that methodologies to be used to minimise and mitigate marine ecology impacts (e.g. rehabilitation and replanting) are not specified.

Offsets

DEWHA also notes the proponent intends to discuss (with Queensland regulators) the provision of environmental offsets in relation to mangrove and saltmarsh clearing. DEWHA highlights that it is appropriate that the proponent also discuss provision of environmental offsets with the Australian Government, as the mangrove and saltmarsh areas form an intrinsic part of the World Heritage listed area and contribute to habitat for listed and threatened species.

Proponent's response

Methodology

The proponent has responded that methodologies to be adopted for clearing of mangroves will include; the hand removal or trimming of mangrove trees and branches by an arborist if required, to avoid potential impacts to adjacent habitat communities during construction activities; where necessary, the proponent will assist with the re-establishment of mangrove communities that have been directly impacted by construction activities.

Offsets

The proponent does not propose any environmental offsets in relation to Australian Government matters of NES associated with clearing of mangrove and saltmarsh areas, as the proponent considers that potential direct and indirect impacts resulting from the loss of mangroves and saltmarsh, associated with the GLNG Project, will not significantly impact World Heritage values.

10.9.18 LNG facility—Dugong and marine turtle mitigation measures

DEWHA advises that mitigation measures in relation to protection of dugong and marine turtles are not described in sufficient detail within SEIS Attachment F – LNG Facility, F5 – Marine Ecology, Part 2 – Turtle and dugong management plan. For example: ‘an agreed set of actions will be implemented should they (dugongs and marine turtles) be sighted within a specified distance of the dredger’; and ‘halting dredging operations *may* also occur in the event that turtles or dugong approach the dredge vessel within 50m’. DEWHA require that the proposed mitigating actions be explicitly clear in order that an evaluation of the adequacy of mitigation and residual impacts can be made.

Proponent’s response

The proponent has responded that dredging will not be carried out while dugongs, turtles or other marine species of conservation significance are observed within 150 m of the dredge, or while migratory birds are observed within 25 m of the dredge. Further, where turtle or dugong or other marine species are observed within a 150 m radius of the dredge and likely to interact with the dredge gear, the dredging activities will temporarily cease or be relocated.

10.9.19 LNG facility—flaring

DEWHA advises that a more adequate reduction of the environmental risks at key times of endangered and migratory turtle life cycle would be provided if the proponent made a commitment for scheduled maintenance flaring to be avoided during turtle breeding and hatching seasons. DEWHA refers to SEIS Attachment F – LNG Facility, F5 – Marine Ecology, Part 2 – Flaring, p.17.

Proponent’s response

The proponent has responded that SEIS Attachment F – LNG Facility, F5 – Marine Ecology, Part 3, Section 4.2.5 details management actions and strategies for avoiding impacts to nesting turtles from maintenance flaring activities. Section 2.3 describes the reproductive biology of the three species of turtles known to nest within the southern GBRWHA. The loggerhead turtle nests between late October and early December with peak nesting occurring in between November and early December. The green turtle nests between late November and January in southern Queensland. The flatback turtle nesting activity reaches a peak between late November and early December (similar to the loggerhead) and ceases by late January. Using this information, turtle nesting activities for all three species are likely to occur on Curtis and Facing Island from late October through to late January, with peak activity occurring in November through to early December. The proponent is committed to only conducting scheduled maintenance flaring activities during the daytime hours during the period from November to January. Scheduled maintenance flaring would be planned during night or day outside of this period (i.e. from February to October).

The proponent has further responded that an assessment to determine whether there is a direct line of sight between the gas stacks at the LNG Facility (99 m in height) and emergency/non-scheduled maintenance flaring (maximum 179 m flare) to turtle nesting beaches on southern Curtis Island and northern Facing Island indicated a possible impact at southern Curtis Island. The proponent has committed that in the event that emergency flaring takes place within turtle nesting season, a monitoring program would be implemented as detailed in the Turtle and Dugong Management Plan (Attachment F5 of the SEIS).

10.9.20 Marine turtle and dugongs—lighting and flaring

DEWHA advises that proposed mitigating actions for lighting and flaring are not explicit or definite and hence not auditable, for example: ‘Take particular care during late October to end January, nesting



season of the following three species known to nest on Curtis and Facing Island'; and 'assessment of light intensity levels in near shore areas and on vessels and where practicable avoid lighting spill through the use of shielding directional lighting and other techniques'.

Proponent's response

The proponent has responded by referring DEWHA to the abovementioned commitments regarding flaring activities, these include:

- conducting scheduled maintenance flaring activities only during daytime hours during the period from November to January. Scheduled maintenance flaring would be planned during night or day outside of this period (i.e. from February to October), and
- in the event that emergency flaring takes place within turtle nesting season, a monitoring program would be implemented as detailed in the Turtle and Dugong Management Plan (Attachment F5 of the SEIS).

I **note** that a response has not been provided in relation to lighting matters.

10.9.21 Marine turtle and dugongs—vessel movement

DEWHA advises that vessel movement impact mitigation actions need to be clearly specified. For example, DEWHA requests information regarding: the maximum vessel speed; and the proposed response in the event that the constant watch identifies dugong or turtle.

Proponent's response

The proponent has responded that the risks involved with vessel movement include the potential for impacts (boat striking) causing injury of marine mammals and turtles. The *Transport Operations (Marine Safety) Regulation 2004*, Sections 127, 128 and 129 and 130 apply and refer to ships not being operated at a speed of more than six knots when within 30 metres of any wharf, boat ramp or pontoon, a vessel at anchor or moored or made fast to a jetty. The proponent states that with the exception of the above, no speed restriction is specified in Port Curtis, however Ship Masters should be fully aware of the effects of interaction (particularly when passing ships moored at berths adjacent to the channels, ships flying international code signals 'A' or 'R' over 'Y' and any directive given by Gladstone Harbour Control).

The proponent has identified that fast moving planing vessels, such as water taxis and recreational vessels, pose the greatest threat for vessel strike to dugong and turtles due to a reduction in the time available to escape from oncoming vessels. The proponent is willing to work cooperatively with the Gladstone Port Corporation and other users of Port Curtis to determine whether speed restrictions are required for high speed vessels proposed to ferry staff from the mainland to Curtis Island.

In the event that constant watch identifies a dugong or turtle is in the vessel path, the proponent has responded that its vessels will take all measures to avoid impact.

10.9.22 Marine turtle and dugongs—noise and vibration

DEWHA advises that further details are required regarding proposed noise and vibration impact mitigation actions and procedures (provided EIS in SEIS Attachment F – *LNG Facility*, F5 – *Marine Ecology*, Appendix A – *Marine turtle and dugong management issues, actions and strategies summary table*). In particular: 'marine fauna activities will be visually assessed and if a sighting occurs when drilling or dredging (especially during periods of high activity or nesting) then management procedures will be enacted'; 'Procedures will be developed to ensure a dugong and sea turtle watch is maintained in the area before activities commence'; and 'soft start procedures for piling operations'.

Proponent's response

The proponent has responded that a number of management measures will be employed to minimize the impacts on marine mega fauna from noise generated from pile driving operations associated with the construction of the marine facilities. The proponent states that these measures are consistent with the Australian Government policy '*Interaction between offshore seismic exploration and whales (EPBC Act*

Policy Statement 2.1, DEWHA 2007). The proponent proposes to implement these measures where appropriate, and that measures will include the following:

- (a) planning construction activities. Construction operations will be scheduled, where possible, to avoid times that local marine mammals are calving, as lactating females and young calves are more likely to be particularly vulnerable to noise emissions. Onshore piling will be sequenced so that no plant, including the piling hammer, will operate within the water. Offshore piling and related equipment will be acoustically decoupled from the hull of the piling vessel
- (b) monitoring for mega fauna. The area of sea surrounding the pile driving operations will be scanned for marine animals. This will include visual observations or the use of hydrophones, which can be used in poor weather conditions. Suitably qualified marine mammal observers will be engaged to oversee the operations.
- (c) implementation of exclusion zones. An exclusion zone of approximately 500 m radius will be monitored for at least 30 minutes before the start of piling operations. If marine animals are observed in the exclusion zone, marine works will be delayed until marine animals have left the area. If marine animals enter the exclusion zone after piling has commenced, marine works will cease until marine animals have left.
- (d) implementation of 'soft start' procedures. Soft start procedures will be implemented at the commencement of pile driving operations. This will involve the use of a low energy start to the operations, providing marine animals an opportunity to leave the area and therefore avoid undue stress. These measures will be monitored to determine the effectiveness of 'soft starts' pile-driving operators.
- (e) attenuation measures. The proponent will also investigate the implementation of attenuation measures for pile driving that may include surrounding piles with an air bubble curtain which can significantly reduce noise emissions.
- (f) compliance and reporting. The proponent will maintain a record of procedures employed during piling operations. Such records will be auditable and will account for all aspects of the operation as it relates to legislative approvals and regulations.

I note that DEWHA have subsequently advised that the proponent's Marine Fauna Management Plan should reference the sound levels that will be generated by the pile driving, and provide the basis for the exclusion zone.

10.9.23 Environmental management plans

DEWHA have advised that the various Environmental Management Plans (EM Plans) submitted for the project lack clarity. DEWHA require that the EM Plans contain specificity, measurability, time specific conditions and the inclusion of definitions to ensure that the actions are auditable to enable verification of compliance.

As currently worded, the unauditable commitments in the EM Plans are generally considered to be unacceptable¹⁶⁹ for EPBC Environmental Management Plan purposes. DEWHA require adjectives such as 'appropriate' be removed from all GLNG EM Plan commitments.

Proponent's response

The proponent has responded that the EM Plans will be reviewed and revised to address DEWHA's submission and will be provided as supporting documentation for the environmental authority applications under the *Environmental Protection Act 1994* (Queensland).

¹⁶⁹ Examples of unauditable (hence unacceptable) commitments in EM Plans submitted for the GLNG project include: 'the EMP will be reviewed regularly'; reporting to the 'appropriate authority as required'; 'regularly inspected'; 'routine inspections'; and 'appropriate controls will be implemented'.



10.9.24 Draft policy on environmental offsets under the EPBC Act

DEWHA advises that the Australian Government's environmental offset policy under the EPBC Act (referred to in SEIS Attachment D5, Part 4, Section 1.1) should be noted as a draft policy only.

Proponent's response

The proponent has acknowledged that the Australian Government 'Policy Statement: Use of Environmental Offsets under the EPBC Act 1999' is still in draft form.

10.9.25 Environmental offset ratios

DEWHA has expressed that as environmental offset ratios have not yet been finalised, it is unclear whether the residual impacts of the action will be acceptable to DEWHA.¹⁷⁰

Proponent's response

The proponent has responded that a detailed environmental offset strategy has been prepared by Ecofund Queensland to address requirements for the GLNG project. The offset strategy has considered and addressed issues raised by DEWHA and the Queensland Department of Environment and Resource Management (DERM).

10.9.26 Indirect environmental offsets

DEWHA has noted that the EIS indicates direct offsets are being contemplated by the proponent, and has questioned whether the proponent is also considering indirect offsets.

Proponent's response

The proponent has responded that the GLNG environmental offset strategy (prepared by Ecofund Queensland) details a number of proposed offset options including both 'traditional' and 'strategic' offset approaches for each component of the project.

10.9.27 Perpetuity of tenure—ongoing protection of environmental offsets

DEWHA requires that proposed environmental offset sites be protected by tenure in perpetuity to ensure long-term protection and management of environmental values.

Proponent's response

The proponent has responded that GLNG environmental offset strategy (prepared by Ecofund Queensland) details a number of approaches to secure tenure.

10.9.28 Environmental offsets strategy

DEWHA advises that details (in SEIS Attachment D5, Part 1, Section 1.7.2) regarding an environmental offsets strategy are inadequately described. DEWHA acknowledges that any offset proposal is an iterative process, and a proposal and/or strategy of the offsets package could be provided as a starting point for future offset discussion with DEWHA.

DEWHA requires further details regarding the proponent's offsets strategy.

Proponent's response

The proponent has responded that a detailed environmental offsets strategy has been prepared by Ecofund Queensland to address the environmental offset requirements for the GLNG project. The proponent advises that a copy of the offsets strategy has been provided to DEWHA.

¹⁷⁰ DEWHA refers to SEIS Attachment D5, Part 4, Section 3.1.3.

11 Conclusions

I am satisfied that the EIS process conducted for the project adequately meets the requirements for impact assessment, to the greatest extent practicable, in accordance with the provisions of Part 4 of the *State Development and Public Works Organisation Act 1971* (Qld) and Part 5 of the *State Development and Public Works Organisation Regulation 1999* (Qld), as specified in Schedule 1 (Item 2, Class 2) of the *Bilateral Agreement between the Australian Government and Queensland*.

The EIS process has provided sufficient information to all stakeholders to allow an informed evaluation of potential environmental impacts which could be attributed to the project. Careful management of the key construction and operational activities should ensure that any potential environmental impacts will be minimised or avoided.

An assessment of the extent to which the material supplied (by the project proponent as part of the EIS process) addresses the relevant impacts (actual or likely impacts) on Matters of National Environmental Significance of each controlled action for the project, is provided in this report.

Conditions have been set by me in this report in order to further manage impacts to threatened species, ecological communities, natural and heritage features, transport impacts, safety and risk and social impacts through management strategies, regulatory conditions and monitoring and reporting requirements.

I consider that on balance there are strong positive net advantages to be derived from the project that will benefit the state of Queensland.

Therefore I recommend that the GLNG project, as described in detail in the EIS and the SEIS summarised in Section 2 of this report, can proceed, subject to the conditions contained in Appendices 1-4 of this report.

Despite the above, in the event of any inconsistency between the project as described in the EIS, SEIS, and the Coordinator-General's conditions, the conditions shall prevail. GLNG and its agents, lessees, successors and assigns, as the case may be, must implement the conditions and recommendations of this report and all commitments presented in the EIS, SEIS and EMPs.

It is the responsibility of the proponent to ensure the project is carried out in accordance with the EIS as modified by the SEIS and that full compliance with all imposed conditions is achieved.

Copies of this report will now be issued to:-

- Santos Ltd as the designated proponent representing the SANTOS-PETRONAS joint venture GLNG, in accordance with section 35(5)(a) of the SDPWO Act,
- Department of Environment and Resource Management in accordance with section 43 and 53 of the SDPWO Act, with respect to:
 - Recommended conditions to be attached to a development approval for Environmental Authorities under the *Environmental Protection Act 1994*
 - As assessment manager for development approval for operational works pursuant to the *Sustainable Planning Regulation 2009*, VMA and *Water Act 2000*
- Department of Employment, Economic Development and Industry (DEEDI) (particularly Queensland Mines and Energy) (QME) as assessment manager for development approval for petroleum activities pursuant to the *Petroleum and Gas (Production and Safety) Act 2004*.
- Gladstone Regional Council, Maranoa Regional Council and Banana Shire Council as assessment managers for development approval for any aspects of development within the local government areas pursuant to the *Sustainable Planning Regulation 2009*.
- Department of Transport and Main Roads with regard to transport infrastructure required under the *Transport Infrastructure Act 1994* and *Maritime Safety Regulations 2004*.
- Gladstone Ports Corporation as assessment manager for the development within the Gladstone strategic port land.



- Department of Justice and Attorney-General (Hazardous Industries and Chemicals Branch) as assessment manager for major hazard facilities under the *Dangerous Goods Safety Management Act 2001*

Other advisory agencies and private submitters who participate in the EIS process will also be provided with a copy of this report. In accordance with section 35(5)(b) of the SDPWO Act, a copy of this report will also be made publicly available on the Department of Infrastructure and Planning's website at www.dip.qld.gov.au.

Appendix 1

Whole of project

This appendix applies to the whole project.

Part 1—general

Coordinator-General imposed conditions—general

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1

The following third party auditing requirements must be applied for the whole project:

- a) compliance with the Coordinator-General's imposed conditions of this report must be audited by an appropriately qualified and experienced third party auditor or auditors appropriate to the matters being audited, nominated by the proponent and accepted by the Coordinator-General within one year of the commitment of the project and annually thereafter
- b) the proponent must submit the third party audit report(s) to the Coordinator-General within 42 days of the end of the relevant period
- c) the audit report must identify the segment of the project being audited, the conditions that were activated during the period, and a compliance/non-compliance table. A description of the evidence to support the compliance table must be provided. The audit report shall also contain recommendations on any non-compliance or other matter to improve compliance. The third party auditor must certify the findings of the audit report
- d) the financial cost of the third party audit is borne by the proponent.
- e) The holder of the environmental authority(s) must immediately act upon any recommendations arising from the audit report and:
 - (i) investigate any non-compliance issues identified, and
 - (ii) as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
- f) subject to condition 1(a), and not more than one (1) month following the submission of the audit report, the proponent must provide written advice to the Coordinator-General addressing the:
 - (i) actions taken by the proponent promptly and routinely to ensure compliance with the Coordinator-General's imposed conditions, and
 - (ii) actions taken to routinely prevent a recurrence of any non-compliance issues.



Condition 2

The proponent shall when first becoming aware of a non-compliance of any Coordinator-General imposed condition:

- a) authorise and undertake action to bring the matter into compliance within an effective time frame, and
- b) report the non-compliance and remedial action to the Coordinator-General within five business days.

Condition 3

Case management costs of government

The proponent will contribute to the case management costs of government in managing submissions and assessments required by the Coordinator-General's report expeditiously through agencies over the implementation phase of the project. This will be calculated on a unit basis for the level of an agency's involvement, costed at \$75,000 per unit. The basis of agency allocation of units will be:

Coordinator-General	4 units
Dept of Environment and Resource Management	4 units
Dept of Employment Economic Development and Innovation	2 units
Dept of Transport and Main Roads	2 units
Dept of Community Safety	1 unit
Gladstone Regional Council	2 units
Maranoa Regional Council	2 units
Banana Regional Council	1 unit
Gladstone Port Authority	2 units

The Coordinator-General may allocate further units to the stated agencies or new agencies should additional case management work be required as a result of resubmissions and reassessment. The unit cost will be indexed at the commencement of each calendar year in accordance with schedule 1 of section 25A of the SDPWO Act.

Payment will be required on submission of the first documentation for assessment by the agency concerned.

Condition 4

Greenhouse Gas Emissions Strategy

The proponent must develop and implement a greenhouse gas reduction strategy for the project. The strategy must include, but not be limited to, the company's policy on greenhouse gas emissions, an energy efficiency program, a continuous improvement program, better control systems and a CO₂ recovery plan. The strategy must be submitted to the Coordinator-General for approval within three months of the granting of the petroleum facilities licence for the LNG facility.

Part 2—Transport

Coordinator-General imposed conditions—transport

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1

Prior to the discharge of any pipes at Port Alma, the proponent must:

- a) reach agreement with Gladstone Ports Corporation (GPC) on the impacts and mitigation measures which would apply to pipe imports, given that when explosives/ammonium nitrate vessels are at berth, restrictions are placed on all other shipping activities in the port,
- b) reach agreement with GPC on vessel scheduling and size restrictions (draft, beam and LOA),
- c) obtain the necessary approvals for use of Lot 96 (located approximately 20 km west of Port Alma and 6 km east of Bajool) or an alternative area for pipe storage purposes, and
- d) undertake a Road Impact Assessment and fund all of the necessary upgrades, safety improvement works, rehabilitation, and maintenance costs associated with upgrading the Port Alma/Bajool road as part of the work required under Condition 9.

Condition 2

The proponent shall not discharge any pipes at Gladstone (Auckland Point or Port Central) unless the proponent submits a plan to GPC for its approval to limit the impact of noise during the discharge operation and:

- a) the quantity of pipes to be conveyed by road from the port is less than that required for 70 km of the pipeline route; and
- b) the proponent has in place an agreement with Queensland Rail that all pipe products required for the gas transmission pipeline greater than 70km from Port Central will be transported by rail to, at least, Moura (or somewhere west of Gladstone to be agreed).

Condition 3

If the proponent determines that for either environmental or commercial reasons, it is expedient to utilise another port other than Gladstone or Port Alma to discharge pipe or other materials, then a thorough transport and road impact study will have to be undertaken and a transport plan submitted to the Coordinator-General for approval. In preparing the study and plan, the proponent shall liaise with and have regard to the views of relevant authorities including the Departments of Infrastructure and Planning (DIP), Transport and Main Roads (DTMR), Environment and Resource Management (DERM), Employment, Economic Development and Innovation (DEEDI), the relevant port authority and all relevant local governments

Condition 4

The proponent shall consult with all relevant entities such as GPC, DIP, DTMR (including Maritime Safety Queensland), DERM, DEEDI, Gladstone Regional Council (GRC) within 3 months of commencing the detailed design stage of the Port of Gladstone marine facilities to:

- a) obtain agreement that the proposed use at each berth that the project plans to use for materials and personnel movement is acceptable to GPC
- b) produce an environmental report giving a thorough and full assessment of all environmental values, impacts and mitigation measures for the proposed berth locations that the project plans to use within the Port of Gladstone and submit to GPC for approval
- c) prepare a Gladstone Logistics Plan to incorporate:
 - all proposed material and personnel movements (including through the marina area) around Gladstone



- an outline of proposed integration of facilities and movements with other LNG proponents which have been approved by a Coordinator-General's report, or projects otherwise advised by the Coordinator-General, and
- details of proposed sharing of infrastructure costs.

The Gladstone Logistics Plan shall be submitted for review and approval of GPC, GRC, DTMR and DIP who shall each be paid a fee of 0.2 fee units to off-set costs involved.

- d) negotiate and pay for any necessary road and or intersection improvements that may be required based on the Gladstone Logistics Plan with the relevant authority
- e) negotiate and pay for any necessary berth upgrades (including associated dredging) and vehicle parking stations that will be required to cater for the extra movement of goods and personnel that the project will generate based on the Gladstone Logistics Plan, and
- f) implement the approved Gladstone Logistics Plan.

Condition 5

The proponent shall reach agreement with GPC on the use of any existing berths and the construction of any new berths and shall consult with Marine Safety Queensland (MSQ) and the Harbour Master prior to the commencement of significant construction.

Condition 6

The proponent shall provide bus transportation services for the movement of its construction workforce to and from the marina area to designated worker parking areas as agreed with GPC and GRC. Worker parking areas must be designed and constructed to protect the amenity of neighbours.

Condition 7

Prior to the commencement of any significant construction works on the project, the proponent shall:

- a) prepare and submit for the approval of MSQ and the Regional Harbour Master (Gladstone), a Maritime Safety Management Plan that should ensure navigational safety is maintained at all times for the life of the project. Information should include, but not be limited to:
 - i. types of ships
 - ii. size of ships
 - iii. maximum draughts
 - iv. frequency of movements
 - v. proposed patterns of operation, and
 - vi. berths used and purpose of usage
- b) prepare and submit for the approval of DTMR, a Harbour Management Plan for vessel traffic management services required by the project. Ensure terminology used in the plan is consistent with the Transport Operations (Marine Safety Regulations 2004), and
- c) provide / upgrade all aids to navigation and / or vessel traffic management services required for the project in accordance with the above mentioned Maritime Safety Management Plan.

The proponent shall implement the approved Maritime Safety Management Plan and Harbour Management Plan.

Condition 8

The latest ferry design and operation methodology shall be utilised to minimise the impact of wash and sediment disturbance on the shorelines of both Curtis Island, other affected islands, and the mainland.

Condition 9

Prior to significant construction works, the proponent must:

- (a) participate in the Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts and cooperate with the study consultants and provide all RIAs and draft RMPs to DIP as inputs into the Study, and
- (b) implement the findings of this Study, both in finalisation of RMP's and any infrastructure agreements regarding road infrastructure, which may be required to address road impacts.

Condition 10

Prior to commencement of any significant construction works, the proponent must:

- a) finalise the road impact assessment (RIA) that includes details of all project transport impacts on the safety and efficiency of state-controlled roads. The RIA must be prepared in accordance with the Guidelines for Assessment of Road Impacts of Development (2006) and the methodology outlined in the Notes for Contribution Calculations prepared by the former Department of Main Roads Central District. The RIA is to be prepared in consultation with the Manager (Corridor Management and Operations) DTMR Rockhampton Regional Office and submitted to DTMR for review and approval
- b) prepare a road-use management plan (RMP) for all use of state-controlled roads for each phase of the project. The RMP will detail traffic volumes, proposed transport routes, required road infrastructure maintenance and/or upgrades to mitigate road impacts, any necessary conditions about access/connection to public roads, transport scheduling, dust control and road safety. The RMP is to include arrangements to ensure compliance with the management of freight, and materials and workforce movements associated with the project. DTMR must approve the plan prior to implementation
- c) include in the final RMP any outcomes of the Road Transport Cumulative Impacts Study, before negotiation of a road infrastructure agreement with DTMR
- d) enter into a road infrastructure agreement with DTMR to formalise the amount of, and timing for the payment of, contributions towards any necessary road maintenance and upgrades identified in the finalised RMP. If the road infrastructure agreement between the proponent and DTRM is not able to be concluded within six months of approval of the RMP either party may refer the matter to the Coordinator-General for mediation
- e) prior to undertaking major works, obtain the relevant licenses and permits under the *Transport Infrastructure Act (Qld) 1994* for works within the State-controlled road corridor, and
- f) within ninety days of completion of each phase of construction involving permanent works within a state-controlled road corridor, submit 'as constructed plans' to DTMR.

Condition 11

Prior to commencement of any significant construction works, the proponent must:

- a) prepare a local authority road inventory for all roads nominated in the EIS and SEIS for potential use by the project detailing:
 - condition
 - level of service
 - traffic count
- b) any other road and traffic characteristic such as type of user
- c) prepare a road impact assessment (RIA) that includes details of all project transport impacts on the safety and efficiency of the local road network, in accordance with the current standards and policies of the relevant local government. The RIA is to be prepared in consultation with the relevant local government and submitted to the local government for review and approval
- d) identify any requirements for new roads



- e) prepare a road-use management plan (RMP) for all local roads and any new road proposals for each phase of the project. The RMP shall detail traffic volumes, proposed transport routes, required road infrastructure maintenance and/or upgrades to mitigate road impacts, any necessary conditions about access/connection to public roads, transport scheduling, dust control and road safety. The RMP is to include arrangements to ensure compliance with the management of freight, and materials and workforce movements associated with the project. The relevant local government must approve the plan prior to implementation
- f) include in the final RMP any outcomes of the *Road Transport Cumulative Impacts Study – Proposed LNG Industry Impacts*, before negotiation of a road infrastructure agreement with the local authority
- g) enter into a road infrastructure agreement with the relevant local authorities to formalise the amount of, and timing for the payment of, contributions towards any necessary new roads, road maintenance and upgrades identified in the finalised RMP. If the road infrastructure agreement between the proponent and the relevant local government is not able to be concluded within six months of approval of the RMP either party may refer the matter to the Coordinator-General for mediation
- h) The road infrastructure agreement is to include a provision for a review of the infrastructure contribution where changes to the road and intersections are made during the life of the project, and
- i) within 90 days of completion of each phase of construction involving permanent works within a road corridor, submit 'as constructed plans' to the relevant local government.

Condition 12

Prior to commencement of any significant construction works for the project, the proponent must:

- a) prepare a traffic management plan for all state-controlled roads and local roads corridors for review by DTMR, the Queensland Police Service (QPS) and all affected regional councils and take account of the reviews. The proposed plans must incorporate a provision that, prior to commencing any program of high volume or oversize transport movements which may be required for the construction of the project, the proponent will consult with DTMR, the Queensland Police Service and all affected regional councils
- b) the proponent must obtain the necessary permits for any excess mass or over-dimensional loads associated with the project as required under the Transport Operations (Road Use Management) Act 1995, and
- c) the proponent must provide over-dimensional vehicle movement schedules to QPS at least 3 months in advance of the movements occurring. Schedules should be provided to the Regional Traffic Coordinator, Central Police Region, Rockhampton and the Regional Traffic Coordinator, Toowoomba.

The proponent must implement the traffic management plan during construction and commissioning of the project and construction of all roads and intersections.

Condition 13

During the detailed design phase of the project and prior to any road or access track upgrade or construction for the project the proponent will consult with DERM to identify, assess and mitigate impacts to terrestrial and aquatic ecosystems and develop an EMP for design and construction of environmental offset and mitigation measures associated with road and access track works, including assessment of any proposed offsets.

Condition 14

Prior to the commencement of any gas field or pipeline construction in the Roma area, the proponent must:

- a) reach agreement with the Maranoa Regional Council on what upgrades will be required at Roma airport and assist the Council to obtain the relevant approvals to undertake these works
- b) reach agreement with Maranoa Regional Council on what contribution GLNG will make to the cost of the upgrade.

Condition 15 – Impact of gas flares and plumes on air traffic

Prior to committing to flare system design for the LNG plant on Curtis Island:

- a) the proponent will commit, to the fullest extent possible, to stack flares not unreasonably interfering with existing and future Gladstone air traffic, and providing all information reasonably required by airport authorities (CASA, Airservices Australia, and Gladstone Regional Council as airport operator) relating to the design and operation of the stack flare.
- b) the proponent must participate in a study “The Cumulative Impact of LNG Project Gas Flares and Plumes on Air Traffic”, together with other LNG project proponents. The study and solutions recommended by the study are to be funded by all LNG project proponents, and managed by the Coordinator General.

The object of the study is to minimise the impact of LNG project gas flares and plumes on air traffic, and Terms of Reference will be drawn up to include but not be limited to:

1. detailed and cumulative modelling of plume and flare systems
2. environmental and economic impact of flare systems, including ground flares
3. impacts to consider routine and emergency flaring and gas plumes
4. impacts to include a risk-based methodology, utilising statistical analysis
5. airport airspace management arrangements
6. recommending a range of potential solutions and a preferred solution, in consultation with airport authorities
7. recommending a process for facilitation of formal agreement(s) among the LNG industry and airport participants, relating to the impact of gas flares and plumes, and recommending a process for the implementation of solution(s).

In the event that agreement cannot be reached among participants, the matter may be referred to the Coordinator-General for mediation, direction or necessary action.

Condition 16

I require that GLNG work closely with the Officer in Charge, Gladstone District Traffic Branch, Queensland Police Service when developing the Traffic and Transport Management Plan for Gladstone. GLNG should also engage early to ensure a capability in policing response to security risks and emergencies is developed appropriately.

Condition 17

Whilst **I appreciate** that the exact location of the helipad proposed by the proponent cannot be defined until detailed design is completed **I require** that prior to plant construction commencing, GLNG submit all plans for the proposed plant helipad to Coordinator-General once detailed designs are completed, and obtain approval for the helipad site prior to its construction.

RECOMMENDATIONS

Recommendation 1

It is recommended that the proponent coordinate with other LNG proponents in regard to ferry and other related staff travel in order to stagger working shift changes and avoid high personnel shipping periods in the Gladstone mainland and port environs.



Part 3—Social Impact

Coordinator-General imposed conditions—social impact

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project.

These conditions take effect from the date of this report.

Condition 1—Social Impact Management Plan (SIMP)

The proponent must:

- (a) within one month after project commitment, prepare a draft Social Impact Management Plan (SIMP) consistent with the Social Impact Assessment Unit, Department of Infrastructure and Planning draft guidelines and template requirements, for review by the Coordinator-General prior to release. The SIMP must include:
 - i. a Monitoring Program for mitigation and management strategies designed to address social impacts
 - ii. a Community Engagement Strategy which contains a list of key stakeholders and describes their interest in the project; actions, outcomes, mechanisms, to support a regular review of the effectiveness of the community engagement strategy, and
 - iii. a Dispute Resolution Mechanism.

Specification for release of draft SIMP for consultation

- (b) With respect to the draft SIMP:
 - i. prepare a stakeholder engagement plan and schedule to provide opportunities for input from key stakeholders to discuss actions to partner in delivery of the SIMP
 - ii. provide opportunities input to the draft SIMP from those who are most affected by the project
 - iii. take into consideration the increased demands and cumulative effects placed on stakeholders and the community to participate in consultative processes in the region
 - iv. consult directly with State and local governments, in particular the Department of Communities and other relevant State government agencies identified in the draft SIMP; and all local governments affected by the project
 - v. the abovementioned government entities shall be considered key stakeholders, and advice is to be taken from regional offices of state government agencies to identify appropriate regional stakeholders for consultation
 - vi. record stakeholder feedback and provide a report on outcomes of the release of the draft SIMP, and
 - vii. discuss and seek agreement on the content of the draft SIMP including the key responsibilities, timeframes and resourcing implications for the local governments affected by the project.
- (c) Submit the final draft SIMP after consultation to the Coordinator-General for assessment and final approval.
- (d) Implement the final SIMP in conjunction with other social impact conditions specified in the Coordinator-General's Report.

Reporting, Review and Auditing Arrangements

- a) With respect to the SIMP:
 - i. submit an annual progress report. The actual date is to be mutually agreed by the proponent and the Social Impact Assessment Unit, Department of Infrastructure and Planning.
 - ii. undertake an external audit at the completion of the construction stage of the project periodically every 3 years after the commencement of the operational stage at project closure during the decommissioning phase of the project.
 - iii. prepare and submit a report on each audit's findings to the Coordinator-General.
 - iv. all annual, periodical, and audit reports are to be submitted to the Coordinator-General within 60 days of completion of the relevant period.

The proponent may also elect to conduct additional internal reviews.

- b) Revise the SIMP after the completion of the construction stage of the project.

Requirements for any amendments to SIMP:
- c) advise the Coordinator-General under which of the following circumstances it wishes to make amendments and updates to the SIMP:
 - i. strategies and actions no longer meet the desired outcomes, or to improve their effectiveness.
 - ii. changes in government policy, significant changes to company operations and site structure, or significant national/international changes to management approaches and frameworks.
- d) identify a process to facilitate any amendments to be agreed by the proponent and DIP. If necessary, the Community Engagement Strategy should be updated to describe how stakeholders will be engaged in any change process at the time.

Condition 2—Community engagement

GLNG must:

- a) for the life of the project, continue to operate the community shopfronts in Roma and Gladstone to provide information and community access for the project.
- b) for the life of the project, GLNG must consult and provide progress reports to the Maranoa, Gladstone and Central Highlands/Banana Regional Coordination Committees on:
 - i. the Community Engagement Strategy including providing opportunities for the committees to provide input into community engagement activities in each region; and
 - ii. the Stakeholder Management Plan for the purposes of analysing stakeholder needs and tailoring engagement strategies to suit the level of interest and impact relative to each stakeholder; and
 - iii. Analysis of issues raised in the Issue Register and the proponent's response to these issues, including mitigation of social impacts.
- c) for the life of the project, GLNG must gauge community satisfaction in regard to the quality and appropriateness of the project's community engagement strategies including - 1800 free-call service; project website; freepost service; survey instruments; market research; community workshops and public information sessions
- d) for the life of the project, GLNG must conduct issue specific workshops inviting a cross section of the community to discuss potential solutions to key issues



- e) for the life of the project, GLNG must hold periodic community information sessions where landholders and community members are invited to discuss specific issues and negative social impacts of concern
- f) for the life of the project, GLNG must develop and deliver a 'Project Newsletter' to provide updates, RCCC meeting dates and highlights; consultation activities and findings; contact points for community information and enquiries and the project's dispute resolution mechanisms, and
- g) prior to the project closure and the decommissioning of the project component, GLNG must actively inform the community.

Condition 3—Complaints process

The proponent must for the life of the project:

- a) continue the employment of dedicated Landholder Advisors for the Gas fields and pipeline corridor to ensure landholders have 24 hour- 7 day access to raise concerns; and dispute resolution mechanism available to them at no cost to the individual or community.
- b) develop a Protocol for establishing the responsibility for receiving and addressing complaints; and the means of notifying the community of this protocol (e.g. publication of the complaints telephone service, website advice, and address for notices and other correspondence)
- c) develop and maintain a Complaints Process wherein, upon receipt of a complaint, an investigation commences forthwith into the cause of the complaint and any actions reasonably required in addressing the complaint. Feedback to the complainant must be provided as soon as practicable about the action to be taken, and subsequently, the results of any action taken. Relevant authorities, if any, must also be notified of such actions.
- d) Maintain a Complaints Register that includes the following information - identification of the complainant, the identity of the person who is receiving the complaint, the manner in which the complaint was made, the time and date on which the complaint was made, addressed and closed out and description of the complaint. The Register must include identification of the entity responsible for addressing the complaint, a brief summary of any action taken to address the complaint, and a notation as to the satisfaction or dissatisfaction of the complainant with the outcomes and
- e) the proponent's performance in management of complaints is to be included in the Progress Report to the Maranoa, Gladstone and Central Highlands/Banana Regional Coordination Committees (RCCCs).

Condition 4—Industry leadership group

- a) within one month of the project commitment, the proponent must either establish or participate actively in an Industry Leadership Group for CSG Resource Projects to provide cross-project coordination across the region in response to cumulative social and other impacts, and
- b) the Industry Leadership Group for CSG Resource Projects must provide linkages to the Regional Community Consultative Committees (RCCCs) governance arrangements in the regions, unless otherwise directed by the Coordinator-General.

Condition 5—Regional community consultative committees

- a) the proponent is required to establish three (3) Regional Community Consultative Committees (RCCCs) in response to the social impacts identified for each of the project components including the Coal Seam Gas (CSG) field; Gas transmission pipeline; and the Curtis Island (LNG) facility for the life of the project
- b) the three (3) RCCCs are to cover the Council areas of:
 - i) Maranoa Regional Council
 - ii) Central Highlands Regional Council and Banana Shire Council

- iii) Gladstone Region Regional Council
- c) the focus of the RCCC is to respond to social impact mitigation and management strategies identified in the EIS process and to provide oversight of the implementation of the Social Impact Management Plan (SIMP).
- d) the proponent must provide:
 - i) a clear and agreed Terms of References (TOR) for each RCCC, developed in consultation with each of the RCCC chairs and members
 - ii) appoint Independent Chairs for each RCCC and provide out-of-pocket expenses for operational expenses, should it be required, and
 - iii) membership details to include representation from Regional and Shire Councils, State Government representatives, Chamber of Commerce, Service Groups, peak bodies for industry, cultural and welfare provision, and community members.

Condition 6—Committee resourcing

The proponent must:

- a) provide full resourcing of the secretariat for the Regional Community Consultative Committees (RCCCs) to cover Maranoa Regional Council, Central Highlands Regional Council and Banana Shire Council and Gladstone Region Regional Council for each of the GLNG project components (Coal Seam Gas (CSG) field; areas impacted by the gas transmission pipeline; and the Curtis Island (LNG) facility for the life of the all project components and phases of the project.
- b) provide support to each of the RCCCs as stated above in (1) including the requirement that the proponent:
 - i. continue to employ Community Liaison Officers and Shopfront Staff in both Gladstone and Maranoa regions
 - ii. at convenient access point for the local community
- c) the proponent is required to ensure that the Community Liaison Officers provides secretariat support to the Regional Community Consultative Committees for Maranoa; Central Highlands/Banana; and Gladstone; and continues to provide the central point of contact for community relations in the respective regions for the life of the project.

Condition 7—Commitments

The proponent must

- a) prior to the release of the draft SIMP for consideration, provide a copy of the final Commitments Register for the GLNG project to the Coordinator-General, and
- b) update the GLNG Social Impact Management Plan (SIMP) to include the Commitments.

Condition 8—Community Investment Program

The proponent is required to:

- a) submit a final Community Investment Program for the GLNG to the Coordinator-General prior to the release of the draft SIMP for consideration, and
- b) ensure that the Community Investment Program is incorporated into the final GLNG Social Impact Management Plan (SIMP) for final approval.

Recommendation 1—Community investment funding - Gladstone

The proponent should consider:

- a) providing financial contributions to a special social infrastructure fund in which industry funds are pooled to (1) mitigate the impacts of major project developments in the Gladstone region;



and (2) implement a priority social infrastructure schedule developed as part of the Social Infrastructure Strategic Plan for Gladstone Region (SISP-Gladstone),

- b) participating as a member of a regional advisory group to implement a structure process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Gladstone region are addressed, and
- c) committing to an on-going investment in social facilities and services in the Gladstone region as a long term member of the community.

Recommendation 2—Community investment funding – Roma/Surat

The proponent should consider:

- a) providing financial contributions to a special social infrastructure fund in which industry funds are pooled to (1) mitigate the impacts of major project developments in the Roma Surat region; and (2) implement a priority social infrastructure schedule developed as part of the Social Infrastructure Strategic Plan for Roma Surat Region (SISP-Roma Surat);
- b) participating as a member of a regional advisory group to implement a structure process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Roma Surat region are addressed;
- c) committing to an on-going investment in social facilities and services in the Roma Surat region as a long term member of the community

The quantum of the contributions to social infrastructure referred to in the above recommendations is voluntary for the proponent to communicate to government. It is the expectation of the Coordinator-General that the quantum of such contributions would be commensurate with other industry and proponent contributions and in proportion to their social impact.

This will be informed by the outcomes of studies such as the SISP for Gladstone and similar studies for Surat/Roma regions. This will be part of the Surat Future Direction Statement and Program identified under the Queensland Government *Sustainable Resource Communities Policy*.

Condition 9—Integrated project housing strategy

It is required that the proponent shall develop an *Integrated Project Housing Strategy* for the project in consultation with other major project proponents, Councils and the Department of Communities, within three (3) months from the project commitment, and submit to the Coordinator-General for approval.

The purpose of the strategy is to initiate, cooperative and coordinate approaches in consultation with other major project stakeholders and Government agencies to resolve the cumulative housing impacts, with the outcome of achieving joint mitigation strategies, and delivery of housing solutions.

The strategy shall have provisions to:

- a) provide housing for GLNG's imported workforce that is not housed by the project specific temporary worker accommodation by a range of means including (but not limited to) direct supply of housing/units and facilitating joint ventures for construction of dwellings
- b) provide investment in community housing for households who may be affected by increased housing costs
- c) implement strategies to advise workers and families wishing to settle in project areas of their accommodation options under this strategy
- d) monitor the project impacts on affordable housing, particularly for Indigenous people and low income households.
- e) review performance of workforce housing supply.

The Integrated Project Housing Strategy is to be presented to the Maranoa and Gladstone Regional Community Consultative Committees (RCCCs) for review and to take account of the findings of the review.

The Integrated Project Housing Strategy is to report performance to the Maranoa and Gladstone Regional Community Consultative Committees (RCCCs) and seek input on a regular basis, not exceeding 6 monthly.

Condition 10—Housing for Gladstone region

GLNG or its construction contractors shall provide new or additional housing stock in the Gladstone region to meet 50 per cent or other percentage concluded from the Integrated Project Housing Strategy and approved by the Coordinator-General with advice from the Department of Communities, of the project's workforce seeking to settle in the Gladstone Regional Council area. As a guide, using the workforce estimates of the project EIS the following housing solutions may be required:

- a) 100 houses/units by 12 months after commencement of construction
- b) 190 houses/units by 18 months; and
- c) Maintain this number of housing units until month 40 of the project.

The housing solution supply provided by GLNG and its contractors are to be reviewed every six (6) months under the Integrated Project Housing Strategy for the project.

It is required that the Integrated Project Housing Strategy report to the Gladstone Regional Community Consultative Committee (RCCC).

Condition 11—Housing for Roma region

The proponent or its construction contractors shall provide new or additional housing stock in the Roma region to meet 100 per cent or other percentage concluded from the Integrated Project Housing Strategy and approved by the Coordinator-General with advice from the Department of Communities, of the project's workforce seeking to settle in the Maranoa Regional Council area. As a guide, using the workforce estimates of the project EIS the following housing solutions may be required:

- a) 63 houses/units by 12 months after commencement of the project
- b) 92 houses/units by 24 months
- c) 127 houses/units by 36 months
- d) 160 houses/units by 4 years.

The housing solution supply provided by GLNG and its contractors for the Roma area are to be reviewed every six months under the Integrated Housing Strategy for the GLNG project.

It is required that the Integrated Project Housing Strategy report to the Maranoa Regional Community Consultative Committee (RCCC).

Condition 12—Affordable and community housing solutions

In addition to the conditions above, the proponent is required to provide new or additional supply of housing stock progressively as the project workforce increases.

For each additional imported worker employed by Santos and its contractors to be accommodated in the region's housing pool, GLNG is to provide resources for housing at the rate of:

Community Housing

- a) 1 house /unit for every 20 imported workers settling in Gladstone; and
- b) 1 house /unit for every 20 imported workers settling in Roma

Affordable Housing

- a) 1 house/unit for every 11 imported workers settling in Gladstone; and
- b) 1 house/unit for every 15 imported workers settling in Roma.

Compliance with this condition and suitability of the ratios stipulated above, as decided by the Coordinator-General, with advice from the Department of Communities, is to be reviewed every 6 months under the Integrated Project Housing Strategy.



It is required that the proponent reports to the Gladstone and Maranoa Regional Consultative Committee (RCCC) regarding Affordable and Community Housing Solutions condition for Gladstone and Roma

Condition 13—Local employment and apprenticeship and training programs

The proponent is required to:

- a) provide details of the local employment and apprenticeship and training programs in the final GLNG SIMP for Coordinator-General approval including:
 - i. Local Employment Program, and
 - ii. Apprenticeship and Training Program.
- b) provide progress report updates to the Regional Coordination Committees RCCCs on the implementation of the SIMP as detailed in (1), but not limited to:
 - i. Local Employment Program, and
 - ii. Apprenticeship and Training Program.
- c) provide details of the full range of skills required for its labour force and an appraisal of the gaps in capacity of the local community and region to meet these requirements through its existing workforce and industries, as well as through the training programs offered in the local area and region. Where there are identified gaps, the proponent is to provide a strategy which demonstrates how the proponent will contribute to the effective acquisition of skilled labour and/or training for same. Demonstration will be through:
 - i. skills audit
 - ii. gap analysis
 - iii. skills acquisition strategy

Condition 14—Job referral and job advertising service

The proponent must:

- a) establish a job referral and job advertising service for local businesses with similar trades/skills which require expanding or replacing staff and integrate it with the proponent's own recruitment service, such that applicants can choose from local or project employment prospects
- b) ensure that the same business practice is in place for contractors employing staff
- c) report to the respective Regional Community Consultative Committee on the arrangements for this service
- d) if it is not feasible to set up or continue operating this service prior to closing the service the proponent is to make funding available for an alternative service having the same objectives as this condition, as agreed with the RCCC.

Condition 15—Local industry and participation program

The proponent is required to develop a Local Industry and Participation Program which is consistent with the principles of the *Queensland Government's Local Industry Policy* and associated Guidelines.

- a) The Local Industry and Participation Program must:
 - i. ensure potential local suppliers are provided with information in an equitable and timely manner
 - ii. encourage local businesses to bid on potential contracts, and assess requirements to meet project demands
 - iii. adopt design and procurement strategies to maximise local participation
 - iv. ensure local firms are provided with opportunities to supply under the same terms, standards and conditions as interstate or overseas businesses

- v. ensure contracts are awarded on the basis of the most competitive proposal, which includes due consideration of non-cost factors such as reliability, maintainability, servicing requirements.
- b) ensure the program incorporates performance measurements and feedback mechanisms.
- c) provide support and job opportunities to vulnerable groups in the community including being culturally responsive to cultural needs.
- d) the design and implementation of the Local Industry Procurement and Participation Program is required to provide equal employment opportunities to the community and to adopt employment strategies which support job opportunities for local business participation.
- e) the Local Industry Procurement and Participation is required to develop responses to local, regional and state-wide employment needs and employment opportunities in response to the impacts of this project on the region, and the cumulative impacts of the emerging LNG industry on the region.
- f) the proponent is required to design and implement of the Local Industry Procurement and Participation Program in consultation with the Department of Employment, Education, Economic Development and Innovation (DEEDI), and any relevant regional or industry organisation with similar aims for local business participation.
- g) the proponent must ensure that the Local Industry Procurement and Participation Program is linked to the Social Impact Management Plan (SIMP), community investment program funding principles and other related initiatives to consider option for mitigating on loss of skills to the LNG industry
- h) the Local Industry Procurement and Participation Program is required to provide not less than six monthly progress reports to the Regional Community Consultative Committees (RCCCs).

Condition 16—Community medical and health services

The proponent is required to:

- (a) Consult with Queensland Health (QH) regarding concerns raised in the SIA and EIS submissions regarding potential impacts on community medical and health services and facilities in Gladstone; and incidents response and management related to public health and safety.
- (b) Develop and seek agreement from Queensland Health on a Incident Protocol and Procedure with the objective of effectively and efficiently managing responses likely to impact upon public health and safety.
- (c) Ensure the Incident Protocol and Procedure is developed in consultation with the local Health Service Districts - South West Health Service District, Central Queensland Health Service District), which provides the opportunity to discuss the capacity of health services to meet the expected demand for medical and emergency services.
- (d) Review the Incident Protocol and Procedure must be reviewed annually in consultation with Queensland Health as outlined above so that it remains up-to date; and meets the relevant Government policies, guidelines and procedural requirements for incident management.
- (e) Update the SIMP to include performance measures for the implementation of community health service initiatives

Condition 17—Police service delivery

The proponent is required to:

- (a) work with the Queensland Police Service (QPS) regarding planning and response associated with impacts of the GLNG project including potential impacts on police service delivery, particularly regarding the QPS water policing commitment and road safety priorities in the affected area.



- (b) work with the Queensland Police Service (QPS) regarding the potential increased demand on planning and resourcing demands on QPS; including the need for incidents and complaints management regarding traffic and transport movements
- (c) update the SIMP to include performance measures for the implementation of police service delivery initiatives.

Condition 18—Emergency services planning

The proponent is required to:

- (a) Consult with the Queensland Police Service (QPS) and Maranoa Regional Council, including local emergency services staff in the region to develop and implement Emergency Response Plan for the project
- (b) Prepare a Emergency Response Plan which must identify the roles and responsibilities in incident command and investigation; and include all stakeholders, including QPS in the Emergency Response Exercises.
- (c) Update the SIMP to include performance measures for the implementation of the Emergency response plan and emergency response exercises.

Appendix 2

Gas Fields

Part 1—Coordinator-General imposed conditions-gas fields

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I nominate that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1 – Council consultation

Prior to commencement of significant construction works, the proponent is to consult with Maranoa Regional Council to determine the appropriate location and requirements, including regional and local planning issues, noise impacts and energy efficiency measures, of all temporary and longer-term workers' accommodation.

Condition 2 – Stock routes

Prior to construction, the proponent and its contractors must consult with the relevant Department of Environment and Resource Management's Senior Lands Officer (Stock Routes) and local government stock route officers through the relevant regional offices, in relation generally to the intended location of the gas field infrastructure and associated infrastructure and the potential impacts on the stock route, as well as specifically to the following:

- a) where there are to be permanent disruptions to the stock route network, the corridors shall be realigned or the stock routes replaced with a similar width and suitable country type to allow for the unimpeded movement of travelling stock
- b) where there are to be temporary disruptions to travelling stock (i.e. from the installation of buried infrastructure), suitable arrangements must be negotiated with the relevant local government prior to the commencement of works
- c) options for permanent or temporary diversions of stock may be considered provided that the routes are safe for travelling stock and drivers, and the travelling public
- d) adequate watering facilities and other travelling stock infrastructure shall be provided where existing facilities become redundant due to approved project activities, and
- e) the parts of the stock route network disturbed or affected by the works must be rehabilitated, upon completion of the project, to a state that is safe for travelling stock and drivers, and the travelling public, and is consistent with the area's pre-disturbance state unless otherwise agreed by DERM and the local government.

Condition 3 - TWAF

All temporary workers' accommodation provided for the project must comply with the *Queensland Development Code Part MP 3.3 Temporary Accommodation Buildings and Structures* (1 February 2010 draft; until the code is finalised).

Condition 4 – TWAF sewage

All on-site sewage treatment plants associated with temporary and longer-term workers' accommodation must be located above Q50 flood levels for temporary accommodation and Q100 flood levels for longer term accommodation. Longer term accommodation means those facilities which are to be located in the one place for 4 years or more.



Condition 5 – Waste disposal

Prior to commencement of works, the appropriate methods for disposal of waste in accordance with reasonable requirements of local governments and DERM are to be ascertained and implemented.

Condition 6 – Potable water

The proponent must ensure that all potable water consumed on site and at workers accommodation complies with the *Australian Drinking Water Guideline 2004*.

Condition 7 – TWAF facilities upgrades

Prior to commencement of significant construction works, the proponent must determine from all relevant local governments, any upgrades to sewage or waste disposal facilities required as a result of the project's requirements, including servicing of workers' accommodation, and meet any costs associated with these upgrades.

Condition 8 – TWAF flood level

All temporary and longer term workers' accommodation is to be located above Q50 flood levels for temporary accommodation and Q100 flood levels for longer term accommodation. Longer term accommodation means those facilities which are to be located in the one place for 4 years or more.

Condition 9 - GQAL

Any longer-term workers accommodation, must not be located on land identified as being Good Quality Agricultural Land by the regional compilation of mapping (1:250,000) of Good Quality Agricultural Land in the Central West Region of Queensland—(NRW 2004)

Condition 10 - Noise

Longer-term workers accommodation for the project must be designed to meet the noise design objectives at sensitive receptors set out in Table 1.

Table 1: Noise design objectives for workers accommodation

Time of day	Noise design objectives for indoors measured at the receptor in dB(A)		
	LAeq,adj,1hr	LA10,adj,1hr	LA1,adj,1hr
Daytime and evening	35	40	45
Night time	35	40	45

Condition 11 – Emergency response

An Emergency Response Plan is to be prepared in consultation with the Department of Community Safety, local governments and Queensland Police. The Emergency Response Plan is to be submitted for approval by the Department of Community Safety, Regional Councils and Queensland Police at least two months prior to its implementation.

Note: Department of Community Safety, local governments and Queensland Police shall provide a response to the Emergency Response Plan within one month of receipt of the plan from the proponent. If no response is provided within the one month period the plan is deemed to be approved.

Condition 12 – Bus transport

The proponent must provide, and ensure use of, bus transportation services for large scale movement of construction and operational workforce resident in temporary and longer-term workers' accommodation to and from the project sites and airports at end of work rotations.

Part 2—Coordinator-General environmental conditions—gas fields

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project.

These conditions take effect from the date of this report.

INFORMATION REQUIRED IN THE FOLLOWING CONDITIONS IS TO BE PROVIDED FOR REVIEW OR APPROVAL BY THE COORDINATOR-GENERAL PRIOR TO THE ISSUE OF ENVIRONMENTAL AUTHORITIES FOR GAS FIELDS

Condition 1—Constraints planning

The proponent must prepare a constraints planning and field development protocol for petroleum activities that:

- a) includes all category A, B and C environmentally sensitive areas. Category C Environmentally Sensitive Areas must include:
 - i. nature refuges as defined under the *Nature Conservation Act 1992*
 - ii. koala habitat areas as defined under the *Nature Conservation Act 1992*
 - iii. state forests or timber reserves as defined under the *Forestry Act 1959*
 - iv. declared catchment areas under the *Water Act 2000*
 - v. resources reserves under the *Nature Conservation Act 1992*
 - vi. an area identified as “Essential Habitat” for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*
 - vii. any wetland shown on the Map of Referable Wetlands available from DERM’s website; or
 - viii. ‘of concern’ regional ecosystems identified in the database maintained by DERM called ‘Regional ecosystem description database’ containing regional ecosystem numbers and descriptions.
- b) nuisance constraints for noise and air impacts
- c) soils constraints (including Good Quality Agricultural Land and Strategic Cropping Land)
- d) the exclusion of infrastructure (that are not pipelines or roads) from flood areas impacted by a 1:50 ARI
- e) exclusion of petroleum activities in Riverine improvement trust asset areas;
- f) bioregional corridors
- g) other constraints identified by Santos in siting infrastructure
- h) commits to undertaking and documenting field surveys for all classes of constraint prior to commencing petroleum activities
- i) commits that field surveys inform the Field Management Protocols and will be undertaken at all times by a qualified person
- j) commits to incorporating constraint commitments into operational plans for the life of the project.

The constraints planning and field development protocol is to be submitted to the Coordinator-General for review prior to the issue of environmental authorities for petroleum tenure.



Condition 2—Cumulative impacts

The proponent must provide to the Coordinator-General for review a revised report on the cumulative impacts of the gas field development. The report must address cumulative impacts of the project and other gas field development projects addressing impacts on regional values for:

- a) regional impacts on terrestrial flora and fauna, biodiversity values, listed species and ecosystems
- b) riparian habitats
- c) surface and ground water environmental values
- d) soils, including ability to support ongoing agricultural production.

Condition 3—Coal seam gas water management plan

The proponent shall provide a Coal Seam Gas Water Management Plan (CWMP) to incorporate provisions which meet the requirements of:

- a) the Queensland Government's policy on coal seam gas water management
- b) DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*
- c) DERM Guideline: *Approval of coal seam gas water for beneficial use*
- d) the *Environmental Protection (Waste Management) Regulation 2000*
- e) DERM Healthy Headwaters study: *Characterisation of salinity limits related to the use of CSG water for irrigation* (DERM, January 2010).

The Coal Seam Gas Water Management Plan is to be submitted to the Coordinator-General for approval prior to the issue of environmental authorities for a petroleum lease.

The Coal Seam Gas Water Management Plan is to be provided to DERM as a component of the EM Plan submitted with applications for environmental authorities.

Condition 4—Brine management strategy

The proponent shall provide a Brine Management Strategy that includes:

- a) the Queensland Government's policy on coal seam gas water management
- b) a strategy consistent with the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*; and
- c) any plan for reinjection of brine or untreated water; and
- d) any plan for the utilization of salts extracted from associated water; and
- e) an assessment of the potential impacts of options considered and appropriate mitigation measure for the preferred option.

The Brine Management Strategy is to be submitted to the Coordinator-General for approval prior to the issue of environmental authorities for a petroleum lease.

The Brine Management Strategy is to be provided to DERM as a component of the EM Plan submitted with applications for environmental authorities.

Condition 5—Environmental offsets

An Environment Offsets Program, consistent with the *Queensland Government Environmental Offset Policy 2008* and specific issue policies must be provided to the Coordinator-General for approval covering gas field development, pipeline construction and LNG facility construction and operation prior to the issue of environmental authority.

The program must address, but not be limited to, impacts on vegetation and biodiversity arising from:

- (a) development and operation of the coal seam gas fields

- (b) other activities (e.g. workers' accommodation facilities, port works for the project, ancillary works)

The program must detail:

- (a) the principles adopted for the environmental offsets strategy
- (b) the predicted total loss (extent and type) of areas of ecological value, (e.g. remnant vegetation, high value regrowth, wetlands, significant conservation species, habitat, biodiversity corridors) which, for the listed species and communities and essential habitats, shall be no greater than the areas specified for each item in the tables of section 6.5 of the Coordinator-General's report and corresponding tables in the Proponent's SEIS, with appropriate allowances for reductions due to co-location of species within habitats and ecosystems
- (c) the procedure to identify the requirements for environmental offsets for specific components of the project over the life of the project
- (d) relevance to any legislative requirements for offsets
- (e) the location, size and values of the offsets
- (f) the management measures, including funding, required to secure, maintain and enhance values of the offset; and
- (g) a system for reporting to the Coordinator-General on offset arrangements, their management and how offset values are being maintained.

The offsets program must be provided to the Coordinator-General for approval prior to the issue of environmental authorities. The State of Queensland reserves the right to require further environmental offsets be supplied by the proponent (environmental authority holder) for the GLNG project following the regulator's evaluation of actual (third-party audit reconciled) vegetation disturbance and rehabilitation information for the project and/or upon receipt and acceptance of, or prior to commencement of, a new operational plan.

The following may be an acceptable solution for the program requirements under paragraphs (b) and (g):

- an initial offset package, consisting of specific land tenures, their environmental values and related management commitments/funding, is to be provided to the Coordinator-General and DERM prior to the issue of any gas field environmental authorities (pursuant to the EP Act); or amendment of any existing gas field environmental authorities, relating to proposed GLNG activities.
- the offset package is to be based on the specific offset requirement derived from "ground truthing" of endangered ecosystems and other vegetation proposed to be disturbed under the new or amended environmental authority.
- to establish baseline information the extent of existing project disturbance (on the petroleum tenement areas the subject of the environmental authority) and the status of the operational plan (including progress and status of rehabilitation) be provided at the time of submission of the offset package.
- each operational plan provide a detailed disturbance and rehabilitation summary that includes: (a) a current account (audit at commencement of operational plan period) of disturbance and rehabilitation; (b) a planning period proposal (for the duration of the operational plan) of disturbance and rehabilitation; and (c) a reconciliation (actual, third-party audited account at the end of the operational plan period) of disturbance and rehabilitation areas.
- the disturbance and rehabilitation information provided in the operation plan should be both qualitative and quantitative in its description of vegetation and use category descriptions that are inclusive and consistent with Australian Government EPBC Act legislation (i.e. EPBC listed communities and species habitat) and Queensland legislation and policy (e.g. areas described include Category A, B and C environmentally sensitive areas).



- the cumulative actual (third-party audit reconciled) vegetation disturbance and rehabilitation information (qualitative and quantitative, using category descriptions as required to be presented in the operational plan), be published, permanently maintained and updated on the proponent's website for the duration of the GLNG project.
- a reconciliation statement should be prepared that accounts for the offsets provided against the actual vegetation disturbance and rehabilitation information (qualitative and quantitative).
- a list of environmental offsets (accepted and in place) for all reconciled vegetation disturbances is simultaneously presented (with the reconciled vegetation disturbance information) and the listed offsets are clearly described (qualitatively and quantitatively), and permanently maintained and updated on the proponent's website for the duration of the GLNG project.
- the reconciliation statement is updated at least annually by the proponent.
- the reconciliation statement (third-party audit reconciled) is to be submitted to the Coordinator-General, and the relevant State and Australian Government environment administering authorities for the project (DERM and DEWHA) on the first annual anniversary of date of approval, and at the end of each operational plan thereafter.

INFORMATION REQUIRED IN THE FOLLOWING CONDITIONS IS TO BE PROVIDED FOR REVIEW OR APPROVAL BY THE COORDINATOR-GENERAL PRIOR TO THE COMMENCEMENT OF CSG ACTIVITIES

Condition 6—Operational Plan

The proponent must provide to the Coordinator-General for review, prior to the commencement of petroleum activities, an Operational Plan that provides detailed information about the activities to be carried out under the environmental authority.

The Operational Plan must cover, at least, one field development area (eg the Roma field) The activities identified in the Operational Plan must incorporate but not be limited to the petroleum activities set out in the approved Work Program and/or Development Plan for the relevant petroleum authority as required under the *Petroleum Act (1923)* or the *Petroleum and Gas (Production and Safety) Act 2004*.

The Operational Plan must be consistent with the requirements of the environmental authority(s) and include, but not be limited to:

- (a) a stated period, not exceeding 3 years, to which the Plan applies
- (b) a description of the existing infrastructure for conducting the petroleum activities
- (c) a description of proposed infrastructure that will be developed during the term of the Operational Plan
- (d) a map or maps that record the location of the infrastructure in place for conducting the petroleum activities that exists at the commencement of the period of the Operational Plan, including but not limited to:
 - regulated dams;
 - wells;
 - transmission flow lines
 - gas processing facilities
 - water treatment facilities
 - records the location of approved additional infrastructure that will be developed for the conduct of the petroleum activities during the period of the Plan.
- (e) a description of proposed infrastructure that will be developed during the term of the Operational Plan

- (f) for proposed disturbance or vegetation clearing in an Environmentally Sensitive Area (ESA) provide details on the scale and extent of the disturbance or clearing and if required a commitment to provide an environmental offset
- (g) for each site to be disturbed, a description of the rehabilitation activities to be performed during the period of the Operational Plan, including but not limited to:
 - location (e.g. tenure, coordinates) and disturbance type (e.g. well lease, flow line, access track)
 - area to be rehabilitated
 - use of reference sites
 - species compositions
 - post-disturbance land use
- (h) a description of progressive rehabilitation carried out including performance in relation to the requirements set out in the environmental authority and the proposed rehabilitation activities set out in the previous Operational Plan; and
- (i) calculation of the financial assurance for the proposed maximum disturbance expected during the period of the Operational Plan.

Note: where the CSG fields are intended to be operated under separate project environmental authorities, separate Operational Plans can be provided under this condition.

Condition 7—Groundwater model

The proponent shall provide to the Coordinator-General for approval, prior to the commencement of any petroleum activities in the petroleum leases, a regional groundwater model that includes all the sandstone aquifers potentially affected, both directly and indirectly, by extraction of groundwater from the Walloon coal measures by the proponent and neighbouring operations to the extent information regarding neighbouring operations is available.

Condition 8—Groundwater and springs

The proponent must prepare a groundwater impact assessment report prior to activities to be carried out under the environmental authority. The report must include:

- a) an assessment of the potential impact on the environmental values detailed in the former Department of Natural Resources and Mines publication *Great Artesian Basin Water Resource Plan: Ecological Assessment of GAB springs in Queensland* (Fensham and Fairfax 2005) and *The AGE Report* (2005) on potential river base flow and springs from aquifers of the Great Artesian Basin, including in the springs register established under the Great Artesian Basin Resource Operations Plan
- b) an assessment of the potential impacts on recharge springs and baseflow watercourses that would result from the induced leakage from the Precipice, Adori and Springbok Sandstone aquifers
- c) mitigation measures that address the potential impacts on river base flow and springs including a monitoring program, trigger points and actions that would be taken to avoid or minimise the impacts
- d) mitigation measures that address the potential impacts on the quality and quantity of supply to existing users including make good options such as reinjection, reconfiguration of extraction regimes, use of offsets (such as replacing other water users' take with associated water from the project), and rehabilitation of existing bores to address potential induced inter-aquifer leakage (that could be a result of depressurisation caused by the project); and
- e) a detailed monitoring strategy that provides objectives and rationale for how potential impacts on groundwater values will be identified including linkages with the hydrogeological conceptualisation, model validation, trigger points and actions that will be taken to avoid or minimise the impacts.

The groundwater impact assessment report is to be submitted to the Coordinator-General for review prior to the commencement of petroleum activities for the petroleum tenure.



The groundwater impact assessment report is to be provided to DERM as a component of the EM Plan with applications for environmental authorities.

Condition 9—Water quality and soil monitoring program

The proponent must prepare a water quality and soil monitoring program that includes:

- a) the identification of surface waters and soil environmental values of the area to be impacted by petroleum activities;
- b) the identification of potential impacts on surface water and soil quality arising from petroleum activities including avoidance and mitigation measures;
- c) impacts on the aquatic ecology of prolonged flow in ephemeral streams arising from release of treated associated water;
- d) a monitoring program to detect changes or impacts to the environmental values identified;
- e) an adaptive framework to address the potential impacts and change petroleum activities to avoid or mitigate identified impacts to environmental values.

The program must be provided to the Coordinator-General for review prior to the commencement of petroleum activities for the petroleum tenure.

General Conditions for the gas fields

Condition 10—Hydraulic fracturing

The EM plans, developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields, must contain an assessment of the impacts from hydraulic fracturing and proposed mitigation measures to protect the groundwater environmental values. The Assessment must address, but not be limited to:

- a) provide a complete inventory of biocides, corrosion inhibitors and other chemicals used in drilling, completions and stimulation operations
- b) provide toxicity data for each active ingredient and any mixture toxicity information
- c) detail where, when and how often fracturing is to be undertaken
- d) provide a risk assessment demonstrating that fracturing activities will not result in environmental harm to the receiving environment based on at least a mass balance demonstrating what concentrations and absolute masses of chemicals will be left in situ subsequent to fracturing and include the results of any previous fracturing fluid monitoring undertaken.
- e) long term monitoring program of fracturing fluid chemical concentrations in CSG water produced from wells that have been fractured needs to be developed and implemented.

Condition 11—Soils Information

Operational plans developed for the gas fields must be accompanied with soils management procedures for areas to be disturbed by petroleum activities to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:

- a) establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients);
- b) a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter;
- c) identify soil units within areas to be disturbed by petroleum activities at a scale of 1:10000, in accordance with the “Guidelines for Surveying Soil and Land Resources, 2nd Edition” (McKenzie et al. 2008), “Australian Soil and Land Survey Handbook, 3rd Edition” (National Committee on Soil and Terrain 2009) and “The Australian Soil Classification” (Isbell 2002);
- d) develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:

- i. shallow cracking clay soils
 - ii. deep cracking clay soils
 - iii. deep saline and/or sodic cracking clay soils with melonholes
 - iv. thin surface, sodic duplex soils
 - v. medium to thick surface (say >15 cm), sodic duplex soils, and
 - vi. non-sodic duplex soils.
- e) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity, and
 - f) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

Condition 12—Construction management plan

The proponent must provide to DERM for review, prior to commencement of construction, a construction management plan for petroleum tenure for the gas fields that includes a construction schedule and methodology including plans and maps showing the location of facilities and discharge points and emission controls for compressor plants, water treatment, sewage treatment and other petroleum activities proposed to be undertaken on the petroleum lease.

Condition 13—Nature Conservation Act

The following requirements apply to clearing of plants protected under the *Nature Conservation Act 1992*:

- a) clearing of plants must only occur in accordance with a clearing permit issued under the *Nature Conservation Act 1992*
- b) for near threatened, rare, vulnerable and endangered species listed under the Nature Conservation (Wildlife) Regulation 2006, and species identified as critical and high priority under the DERM “Back on Track” species prioritisation methodology, a Significant Species Management Plan detailing specific measures for the mitigation or offsetting of all impacts must be provided to DERM for approval
- c) offsets must be provided for the permanent loss (take) of near threatened, rare, vulnerable and endangered plants in accordance with the *Queensland Government Environmental Offsets Policy 2008* and generally in accordance with the *Queensland Government Policy for Biodiversity Offsets (Consultation Draft)*
- d) type A restricted least concern plants (Schedule 7 of the Nature Conservation (Administration) Regulation 2006) must be salvaged and used for on-site revegetation purposes. This includes species in the Family: Cycadaceae, Orchidaceae, and Zamiaceae; and species in the genus: Brachychiton; Hydnophytum; Huperzia; Livistona; Myrmecodia; Platycerium; and Xanthorrhoea
- e) clearing shall be conducted in a sequential manner and in a way that directs escaping wildlife away from the activity and into adjacent natural areas
- f) rehabilitation of areas containing least concern plants that are disturbed during clearing activities, where required by the clearing permit, must be commenced within three (3) months of completion of pipeline construction. Revegetation should be consistent with the plant density, floristic composition and distribution of the surrounding regional ecosystem types and within the province of the vegetation being cleared
- g) for clearing impacts that result in permanent loss of least concern native plants (cannot be re-established within three (3) years of clearing or floristic modification), the permit holder must provide the DERM with a written detailed report of permanent vegetation loss, including the area, species affected and mapping of affected areas, within three (3) months of completion of the pipeline construction (Note: this is in addition to the required Return of operations).



Condition 14—Vegetation and pipelines

- (a) Potential impact mitigation measures must include the allowance for regrowth of natural vegetation in the parts of the pipeline corridors (flow lines, trunk lines and water pipelines) not required for routine operation and maintenance in order to partially address fragmentation of habitat for small animals including birds, mammals, reptiles and amphibians.
- (b) Preconstruction surveys of the activities in gas fields must identify koala habitat as defined under the *Nature Conservation (Koala) Conservation Plan 2006*. Specific mitigation measures and habitat offsets for residual impacts to koala habitat must be provided.
- (c) An authorised person must be employed where there is a risk to native fauna present within the clearing site. An authorised person is a person permitted to tamper and interfere with a protected animal or a protected animal's breeding place. (For example, a licensed spotter-catcher is someone who is specifically licensed as a spotter-catcher through a Rehabilitation Permit issued by DERM.)
- (d) The permit holder must ensure any animals injured by clearing activities under this permit are referred to an appropriate wildlife carer group or veterinarian (to be predetermined prior to clearing) and DERM must be notified within 24 hours of any injuries or deaths.
- (e) Rehabilitation of the gas fields must allow for the maximum re-establishment of native vegetation including the shrubby understorey and ground cover, providing habitat for small ground dwelling fauna species and restoration of landscape connectivity.

Condition 15—Bioregional corridors

The proponent and its contractor shall include in any final environmental management plan for gas fields planning, an objective that bioregional corridors be considered and maintained to the greatest extent practicable in the field development plan. A draft of this clause of the EMP shall be submitted to DERM with an application for an environmental authority for gas field development.

Condition 16—Gas field disturbance limit

The following maximum disturbance limits apply to any disturbances authorised for the gas field activities environmental authority under the *Environmental Protection Act 1994* and any other relevant legislation:

Sensitive regional ecosystems disturbance limit

Regional ecosystems	Description	VM Act status	Disturbance limit (ha)
11.4.3	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> shrubby open forest on Cainozoic clay plains	Endangered	3.3
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	Endangered	16.3
11.9.4	Semi-evergreen vine thicket on fine-grained sedimentary rocks	Endangered	0.8
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of concern	108.9

11.3.17	<i>Eucalyptus populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of concern	12.6
11.9.7	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks	Of concern	1.3

Essential habitat (Vegetation Management Act) disturbance limit

Regional ecosystem	Description	Species	Disturbance limit (ha)
11.9.4 / 11.10.1 / 11.10.13	Semi-evergreen vine thicket and open woodland to open forest	<i>Apatophyllum teretifolium</i>	1 (- 0.8 ha of vine thicket already accounted for)
11.10.1	<i>Corymbia citriodora</i> predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30m high).	<i>Acacia calantha</i>	2.8

Protected plant species (Nature Conservation Act 1992) disturbed by gas field development

Species	NC Act status	Habitat type	Disturbance limit (ha)
<i>Acacia calantha</i>	Rare	Semi-evergreen vine thicket and open woodland to open forest	2.8 (- 1 ha of vine thicket already accounted for)
<i>Apatophyllum teretifolium</i>	Rare	<i>Corymbia citriodora</i> predominates and forms a distinct but discontinuous open-forest (to woodland) canopy (20-30m high).	1 (- 2.8 ha of <i>Corymbia citriodora</i> habitat type already accounted for)

Protected fauna species (Nature Conservation Act 1992) disturbance limit

Species	NC Act and EPBC status	Habitat type	Disturbance limit (ha)
Northern quoll	Endangered	Rocky escarpments, open forest and open woodland	100.1
Large-eared pied bat, large pied bat	Vulnerable	Will forage adjoining woodlands and clearings	(108.1)



Black-breasted button-quail	Vulnerable	Drier closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest	0.1 (Already counted)
Red goshawk	Vulnerable	Eucalypt woodland, open forest, gallery rainforest, and rainforest margins	139.4
Australian painted snipe	Vulnerable	Potentially any wetland and farm dams with suitable vegetation cover	(11.2)
Brigalow scalyfoot	Vulnerable	Lives in brigalow/vine thicket regrowth but not tolerant of clearings	205.3
Collared delma	Vulnerable	Open eucalypt and Acacia woodland with sparse understory of shrubs and tussocks or semi-evergreen vine thicket	41.6 (Already counted)
Squatter pigeon	Vulnerable	Grassy woodlands and open forest that are dominated by eucalypts	199.2
Ornamental snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) woodland growing on clay and sandy soils, riverside woodland, and open forest growing on natural levees	44.0 (Already partially accounted for)
Yakka skink	Vulnerable	Open dry sclerophyll forest or woodland	119.9
Dunmall's snake	Vulnerable	Brigalow (<i>Acacia harpophylla</i>) forest and woodland growing on cracking black clay and clay loam soils	205.3 (Already partially accounted for)
Eastern long-eared bat	Vulnerable	River red gum forest, semi-arid woodlands and savannahs	275.4

EPBC ecological communities disturbance limit

Species	EPBC status	Habitat type	Disturbance limit (ha)
Brigalow ecological community	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) ecological communities	19.6 (Already counted)
Semi-evergreen vine thicket	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nadewar Bioregions	0.8 (Already counted)

Bluegrass ecological community	Endangered	Natural grasslands of the Queensland coastal highlands and the northern Fitzroy Basin	5.2
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Part 3—Environmental Authority Conditions – Model Conditions – Gas Fields

Introduction

DERM, in consultation with the Australian Petroleum Production and Exploration Association (APPEA), has developed 'Model Conditions' that guide environmental authority applicants for coal seam gas fields.

The Model Conditions provides a suite of suitable conditions for CSG specific activities that can be used by DERM as a consistent starting point for the conditioning of environmental authorities for CSG gas field activities.

Department of Environment and Resource Management (DERM)—Model Conditions – Gas Fields

SCHEDULE A—GENERAL CONDITIONS

Authorised petroleum activities

(A1) In the carrying out of the petroleum activity(ies), the holder of this environmental authority must not exceed the number and maximum size for each of the specified petroleum activities listed in Schedule A - Table 1 for each petroleum tenure.

Schedule A, Table 1 – Authorised Petroleum Activities

Tenure No.	Petroleum activity	Number	Maximum size (where applicable)
	Seismic (kms)		
	Core Well(s)		
	Exploration Wells		
	Production Well(s)		
	Compressor Station(s)		
	Regulated Dam(s) >401 megalitres		
	Regulated Dam(s) <400 megalitres		
	Reverse Osmosis Plants		
	Brine Encapsulation Facilities		

Prevent or minimise likelihood of environmental harm

(A2) This environmental authority does not authorise environmental harm unless a condition contained in this environmental authority explicitly authorises that harm. Where there is no condition, the lack of a condition shall not be construed as authorising harm.

Maintenance of measures, plant and equipment

(A3) The holder of the environmental authority must:

- (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;
- (b) maintain such measures, plant and equipment in their proper and effective condition; and

- (c) operate such measures, plant and equipment in a proper and effective manner.
- (A4) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration materially increases, or is likely to increase, the environmental harm caused by the petroleum activity.

Operational plan

- (A5) The holder of this environmental authority must develop an Operational Plan (the Plan) that provides detailed information about the activities to be carried out under the environmental authority.
- (A6) The activities identified in the Plan must incorporate but not be limited to the petroleum activities set out in the approved Work Program and/or Development Plan for the relevant petroleum authority as required under the *Petroleum Act (1923)* or the *Petroleum and Gas (Production and Safety) Act 2004*.
- (A7) The Plan must be consistent with the requirements of the environmental authority and include, but not be limited to:
- (a) a stated period, not exceeding 3 years, to which the Plan applies;
 - (b) a description of the existing infrastructure for conducting the petroleum activities;
 - (c) a description of proposed infrastructure that will be developed during the term of the Plan
 - (d) a map or maps that:
 - i. record the location of the infrastructure in place for conducting the petroleum activities that exists at the commencement of the period of the Plan, including but not limited to:
 - regulated dams
 - wells
 - transmission flow lines
 - gas processing facilities, and
 - water treatment facilities
 - ii. records the location of approved additional infrastructure that will be developed for the conduct of the petroleum activities during the period of the Plan.
 - (e) for proposed disturbance or vegetation clearing in an Environmentally Sensitive Area (ESA) provide details on the scale and extent of the disturbance or clearing and if required a commitment to provide an environmental offset
 - (f) for each site to be disturbed, a description of the rehabilitation activities to be performed during the period of the Plan, including but not limited to:
 - i. location (eg tenure, coordinates) and disturbance type (eg well lease, flow line, access track)
 - ii. area to be rehabilitated
 - iii. use of reference sites
 - iv. species compositions, and
 - v. post-disturbance land use
 - (g) a description of progressive rehabilitation carried out including performance in relation to the requirements set out in the environmental authority and the proposed rehabilitation activities set out in the previous Plan, and
 - (h) the calculation of the financial assurance for the proposed maximum disturbance expected during the period of the Plan.
- (A8) The Plan must be submitted to the administering authority not less than three months prior to the expiry of the Plan period.

Financial assurance

- (A9) The holder of this environmental authority must:
- (a) provide to the administering authority financial assurance in the amount and form required from time to time by the administering authority for the authorised petroleum activities, and



- (b) review and maintain the amount of financial assurance based on the activities and rehabilitation to be undertaken during the period of the Plan.
- (A10) The calculation of financial assurance must be in accordance with the most recent version of the *Department of Environment and Resource Management's Guideline "Financial assurance for petroleum activities"*.
- (A11) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

Third party audit

- (A12) Compliance with the conditions of this environmental authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this environmental authority and accepted by the administering authority, for each period of the Operational Plan required under Conditions A5 – A8.
 - (A13) Notwithstanding condition A12, the holder of this environmental authority may, prior to undertaking the third party audit, negotiate with the administering authority the scope and content of the third party audit
- Note: Where minimal activities have been undertaken on a tenure, the negotiation of the scope of the third party audit may also include the postponing of the third party audit to an agreeable time between the holder of this environmental authority and the administering authority*
- (A14) The report of the third party auditor for the relevant prior period must be submitted to the administering authority by the holder of this environmental authority with each revised Operational Plan submitted in accordance with Condition A8.
 - (A15) The third party auditor must certify (including a statutory declaration) the findings of the audit in the report.
 - (A16) The financial cost of the third party audit is to be borne by the holder of this environmental authority.
 - (A17) The holder of this environmental authority must immediately act upon any recommendations arising from the audit report by:
 - (a) investigating any non-compliance issues identified, and
 - (b) as soon as practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.
 - (A18) Subject to condition A17, and not more than three (3) months following the submission of the audit report, the holder of this environmental authority must provide a written report to the administering authority addressing the:
 - (a) actions taken by the holder to ensure compliance with this environmental authority, and
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified.

Cultural heritage

- (A19) In the carrying out of the petroleum activity the holder of this environmental authority must not adversely impact on the cultural heritage values of any place registered on the Queensland Heritage Register.

SCHEDULE B—WATER

Contaminant release

- (B1) Contaminants that will or may cause environmental harm must not be directly or indirectly released to any waters except as permitted under this environmental authority.

Erosion and sediment control

- (B2) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contaminated stormwater to waters.
- (B3) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority and must include but not be limited to:
- (a) diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater
 - (b) contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority
 - (c) roofing or minimising the size of areas where contaminants or wastes are stored or handled
 - (d) revegetating the disturbed area as soon as practicable after the completion of works
 - (e) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters
 - (f) erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters
 - (g) an inspection and maintenance program for the erosion and sediment control features
 - (h) provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March;
 - (i) erosion and sediment control measures for construction of wells and pipelines on slopes >10 per cent, and
 - (j) identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (B4) A copy of the Erosion and Sediment Control Plan must be submitted to the administering authority upon request.

Maintenance and cleaning

- (B5) The maintenance and cleaning of vehicles and any other equipment or plant must be carried out in areas from where the resultant contaminants cannot be released into any waters, roadside gutter or stormwater drainage system.

Watercourses, wetlands and springs

- (B6) In the carrying out of the petroleum activity the holder of this environmental authority must not clear vegetation or place fill, except for the construction of roads and pipelines, in or within:
- (a) 200 metres from any natural significant wetland;
 - (b) 100 metres from any natural wetland, lakes or springs; or
 - (c) 100 metres of the high bank of any other watercourse.
- (B7) The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse, wetland, or spring, including works that divert the course of flow of the water or works that impound the water.



- (B8) Despite condition B7 pipeline and road construction works for may be undertaken in watercourses, wetlands or springs where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference:
1. conducting work in times of no flow; and
 2. using all reasonable and practical measures to reduce impacts in times of flow.
- (B9) Activities or works resulting in significant disturbance to the bed or banks of a watercourse or wetland, or a spring must:
- (a) only be undertaken where necessary for the construction and/or maintenance of roads, tracks and pipelines that are essential for carrying out the authorised petroleum activities and no reasonable alternative location is feasible;
 - (b) be no greater than the minimum area necessary for the purpose of the significant disturbance;
 - (c) be designed and undertaken by a suitably qualified and experienced person taking into account the matters listed in Section 5. Planning Activities and Section 6 Impact Management During Activities of DERM's "*Guideline – Activities in a watercourse, lake or spring associated with mining operations*" dated April 2008, or more recent editions as such become available; and
 - (d) upon cessation of the activities or works, commence rehabilitation immediately such that the final rehabilitation is to a condition that will ensure the ongoing physical integrity and the natural ecosystem values of the site.
- (B10) Sediment control measures must be implemented to minimise any increase in water turbidity due to carrying out petroleum activities in the bed or banks of a watercourse or wetland, or a spring.
- (B11) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse, wetland or spring. If, due to the petroleum activities, water turbidity increases in the watercourse, wetland or spring outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (B12) Petroleum activities must not be carried out in River Improvement Trust Asset Areas without the approval of the relevant River Improvement Trust.

Note: Locations and details of River Improvement Trust Asset Areas can be obtained from the relevant River Improvement Trust. A list of the relevant River Improvement Trusts will be provided by DERM.

Groundwater

- (B13) The extraction of groundwater as part of the petroleum activity from underground aquifers must not directly or indirectly cause environmental harm to any spring, wetland or other surface waters.

Wild rivers

- (B14) In a declared Wild River Area, petroleum activities must be consistent with the conditions stated in the relevant Wild River declaration and in circumstances where there is any inconsistency or conflict the conditions of the Wild River declaration prevail.

Release to waters of treated or good quality CSG water

Refer Appendix 1 for conditions

Sewage treatment works (<21EP)

Refer Appendix 2 for conditions

Sewage treatment works (>21 – 450 EP)

Refer Appendix 3 for conditions.

SCHEDULE C—REGULATED DAMS

- (C1) Construction of any dam or modifications to an existing dam determined to be in the high hazard or significant hazard category in accordance with the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams* is prohibited unless the required design plan details have been entered into the Regulated Dam Register and certified by the chief executive officer for the holder of the environmental authority, or their delegate, as being accurate and correct.

Regulated Dam Register

- (C2) The holder of this environmental authority must maintain a Register of Regulated Dams that must include, as a minimum, the following information for each Regulated Dam:
- (a) dam name, the coordinates for its location and date of entry in the register
 - (b) dam purpose and its proposed/actual contents
 - (c) hazard category assessed using the “Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”
 - (d) details of the composition and construction of any liner
 - (e) dimensions (metres) and surface area (hectares) measured at the footprint of the dam
 - (f) maximum operational volume (megalitres)
 - (g) design storage allowance at 1 November each year (megalitres)
 - (h) mandatory reporting level (metres)
 - (i) date construction was certified as compliant with the design plan
 - (j) name and qualifications of certifier
 - (k) dates on which the dam was inspected for structural and operational adequacy
 - (l) date on which the report of the annual structural and operational adequacy inspection was provided to the administering authority
 - (m) dates on which the dam was inspected for the detection of leakage through any liner, and
 - (n) dates on which the dam was inspected for the purpose of annually ascertaining the available storage capacity on the 1 November each year.
- (C3) The holder of this environmental authority must provisionally enter the required information in the Register of Regulated Dams when a design plan for a Regulated Dam is submitted to the administering authority.
- (C4) The holder of this environmental authority must make a final entry of the required information in the Register of Regulated Dams once compliance with Condition C21 has been achieved.
- (C5) The holder of this environmental authority must ensure that the information contained in the Register of Regulated Dams is complete and current on any given day.
- (C6) All entries in the Register of Regulated Dams must be certified by the chief executive officer for the environmental authority holder, or their delegate, as being accurate and correct.
- (C7) The holder of this environmental authority must submit the Register of Regulated Dams or information contained in the Register available to the administering authority at each annual return and when requested to do so in the form requested by the administering authority.

Construction and operational requirements for new dams

- (C8) All aggregation dams must:
- (a) be designed with a floor and sides of material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during its operational life including any period of decommissioning and rehabilitation, and



- (b) have a system that will detect any passage of the wetting front or entrained contaminants through the floor or sides of the dam and enable the repair of the containment system or its decommissioning and rehabilitation.
- (C9) Aggregation dams must be designed and operated so that during any period of thirty (30) days, following the first ninety (90) days of operation of the dam, the total volume of water leaving the dam other than by evaporation must not be less than 85 per cent of the volume of water that has entered the dam.
- (C10) All existing CSG evaporation dams must be operated as aggregation dams and in accordance with condition (C8) or decommissioned by 1 October 2011.
- (C11) By 1 October 2011, all brine dams must:
 - (a) be designed with a floor and sides of material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during its operational life including any period of decommissioning and rehabilitation
 - (b) have a system that will detect any passage of the wetting front or entrained contaminants through the floor or sides of the dam, enable the repair of the containment system or its decommissioning and rehabilitation, and
 - (c) the collection and proper disposal of any contaminants that move beyond the bounds of the containment system.
- (C12) All Regulated Dams must be designed in accordance with the requirements of the *“Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”* by and constructed under the supervision of a suitably qualified and experienced person.
- (C13) The hazard category of any dam must be determined by a suitably qualified and experienced person, prior to its design and construction, upon any change in its purpose or its stored contents, and at least once in each two (2) year period after its construction.
- (C14) The construction and operation of Regulated Dams is prohibited unless the holder of this environmental authority has submitted to the administering authority a copy of the design plan, together with the certification of a suitably qualified and experienced person that the regulated dam:
 - (a) will deliver the performance stated in the design plan;
 - (b) has had its hazard category assessed and been designed in accordance with the requirements of the *“Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”*; and
 - (c) when constructed and operated, will be compliant in all respects with the conditions of this environmental authority.
- (C15) The design plan must include, but not be limited to:
 - a) a statement of the relevant legislation, regulatory documents and engineering practice relied upon in the design plan;
 - b) a statement of the facts and data being used in the design plan and the limitations to the application and interpretation of that material;
 - c) an assessment of the hazard category of the proposed dam based on the identification of potential impacts on any sensitive receptors for any applicable dam failure scenarios, including the cumulative impact should all dams fail at once;
 - d) detailed specifications for the design, operation, maintenance and decommissioning of the dam(s);
 - e) an operational plan that includes contingency / emergency response procedures designed to avoid / minimise discharges resulting from any overtopping or loss of structural integrity of the dam;
 - f) design, specification and operational rules for any related structures and systems used to prevent the overtopping of the proposed dam;
 - g) a detailed plan for the decommissioning and rehabilitation of the dam at the end of its operational life;

- h) any other matter required by the certifying suitably qualified and experienced person; and
- i) evidence supporting the claims of the certifier that they are a suitably qualified and experienced person.

(C16) If, within the 20 business days following the lodgement of a certified design plan the administering authority notifies the holder of this environmental authority, in writing, that the design plan is not compliant with either:

- a) the conditions of this environmental authority; or
- b) the requirements set out in the “Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”

then the construction and operation of the Regulated Dam is prohibited until the administering authority provides written advice that its construction may proceed.

(C17) When construction of any Regulated Dam is complete, the holder of this environmental authority must submit to the administering authority one hard copy and one electronic copy of a set of ‘as constructed’ drawings, together with the certification of a suitably qualified and experienced person that the dam ‘as constructed’ will deliver the performance stated in the design plan and at the time of certification it is compliant in all respects with the conditions of this environmental authority.

(C18) Each Regulated Dam must be maintained and operated in a manner that is consistent with the design plan and the certified ‘as constructed’ drawings for the duration of its operational life and until decommissioned and rehabilitated.

Livestock and wildlife

(C19) The holder of this environmental authority must ensure reasonable and practicable control measures are in place to ensure that harm is not caused to livestock or wildlife through the construction and operation of a Regulated Dam.

Mandatory reporting level

(C20) The Mandatory Reporting Level must be marked on each Regulated Dam in such a way that it is clearly observable during routine inspections of each dam.

(C21) The holder of this environmental authority must notify the administering authority immediately when the level of the contents of any Regulated Dam reaches the Mandatory Reporting Level, and immediately act to prevent or, if unable to prevent, to minimise any actual or potential environmental harm.

(C22) An assessment of the adequacy of the available storage in each Regulated Dam is to be made, based on an actual dam level observed in the month of October in each year, and the resultant estimate of the level in that dam as at 1 November in each year must be equal or less than the design storage allowance for the dam.

(C23) Where the assessment of the adequacy of the available storage in any Regulated Dam indicates that the design storage allowance will be exceeded, or at any other time the holder of this environmental authority becomes aware that the design storage allowance has been or will be exceeded, the holder of this environmental authority must immediately notify the administering authority, and immediately act to prevent or, if unable to prevent, to minimise any actual or potential environmental harm.

Annual inspection and report

(C24) Each Regulated Dam must be inspected annually by a suitably qualified and experienced person.

(C25) At each annual inspection, the condition and adequacy of each Regulated Dam must be assessed for dam safety and against the necessary structural, geotechnical and hydraulic performance criteria contained in the certified design plan.

(C26) For each annual inspection, a copy of a report on the condition and adequacy of each Regulated Dam, certified by the suitably qualified and experienced person and including any recommended actions to be taken to ensure the integrity of each Regulated Dam, must be provided to the administering authority upon request.



(C27) The holder of this environmental authority must, upon receipt of the annual inspection report, consider the report and its recommendations, take action to ensure that each Regulated Dam will safely perform its intended function, and within one month of receiving the report, notify the administering authority in writing of the recommendations of the inspection report and the actions taken to ensure the integrity of each Regulated Dam.

Evaporation dams

(C28) Evaporation dams must not be constructed unless:

- (a) exploring for petroleum is the only activity being carried out;
- (b) a report demonstrating that legislative, environmental, technological, economic or social requirements have all been evaluated and taken into consideration in deciding that this is the only feasible option has been provided to the administering authority;
- (c) the evaporation dam does not exceed 400ML in volume or 20ha in surface area; and
- (d) there are no other evaporation or aggregation dams within a 50km radius of surface land area.

(C29) A re-evaluation of the use of any evaporation dam must be undertaken on an annual basis to determine if water management practices can be improved and any preferred management options in the CSG water management hierarchy can be employed.

(C30) The re-evaluation required by Condition C29 must be submitted to the administering authority with each annual return.

SCHEDULE D—Land

General

(D1) Contaminants that will or may cause environmental harm must not be directly or indirectly released to land except as permitted under this environmental authority.

Disturbance to land – General

(D2) Prior to conducting petroleum activities that involve significant disturbance to land, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.

(D3) The assessment required by Condition D2 must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA's) and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.

(D4) The holder of this environmental authority, when carrying out petroleum activities must:

- (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value;
- (b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
- (c) minimise disturbance to land that may otherwise result in land degradation;
- (d) ensure that for land that is to be significantly disturbed by petroleum activities:
 - i. the top layer of the soil profile is removed;
 - ii. stockpiled in a manner that will preserve its biological and chemical properties; and
 - iii. used for rehabilitation purposes (in accordance with Condition H6)
- e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

- (D5) In accordance with Condition D4 above, if significant disturbance to land is unavoidable, the holder of this environmental authority must not clear vegetation or place fill:
- (a) in a way which significantly isolates, fragments or dissects tracts of vegetation resulting in a reduction in the current level of ecosystem functioning, ecological connectivity (i.e. stepping stone or contiguous bioregional/local corridor networks) and/or results in an increase in threatening processes (e.g. potential impacts associated with edge effects or introduced species);
 - (b) on slopes greater than 10 per cent for activities other than pipelines and wells; or
 - (c) in discharge areas.
- (D6) Clearing of remnant vegetation shall not exceed ten (10) metres in width for the purpose of establishing tracks and 20 metres in width for dual carriageway roads unless otherwise approved by the administering authority in writing.
- (D7) Cleared vegetation must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.

Disturbance to land – Environmentally sensitive areas

- (D8) Notwithstanding Conditions D2 to D7 inclusive, the holder of this environmental authority must ensure that petroleum activities:
- (a) are not conducted in or within 200 metres of any listed category A, B or C ESA's; and
 - (b) do not involve activities other than limited petroleum activities within 1km of a listed category A ESA, or within 500m of a listed category B or C ESA.
- (D9) Limited petroleum activities carried out in accordance with Condition D8(b) must be preferentially located in pre-existing areas of clearing or significant disturbance to the greatest practicable extent.

Disturbance to land – Endangered and of concern regional ecosystems

- (D10) Despite Condition D8, where it can be demonstrated that no reasonable or feasible alternative exists, limited petroleum activities may be undertaken within an endangered/of concern regional ecosystem and its associated buffer zone, provided that the area is not part of another listed category A, B or C ESA (e.g. a National Park) or associated buffer zone, subject to the following:
- (a) the limited petroleum activity is located and carried out in areas according to the following order of preference:
 - i. pre-existing cleared areas or significantly disturbed areas less than 200m from an Endangered/Of Concern RE;
 - ii. undisturbed areas less than 200m from an Endangered/Of Concern RE;
 - iii. pre-existing areas of significant disturbance within an endangered/of concern regional ecosystem (e.g. areas where significant clearing or thinning has been undertaken within a regional ecosystem, and/or areas containing high densities of weed or pest species which has inhibited re-colonisation of native regrowth);
 - iv. areas where clearing of an endangered or of concern regional ecosystem is unavoidable
 - (b) any vegetation clearing in an Endangered/Of Concern RE or associated buffer zone must not exceed any of the following areas:
 - i. 10 per cent of the remnant unit of Endangered/Of Concern regional ecosystem as ground truthed and mapped before any activity commences as per condition D1 and D2 of this environmental authority for the life of the project; or
 - ii. more than 30m² for the construction of a sump; or
 - iii. six (6) metres in width for tracks; or
 - iv. twelve (12) metres in width for pipeline construction purposes; and



- (c) all reasonable and practical measures are taken to minimize the area cleared and to avoid the clearing of mature trees, which must include but not be limited to, for each well site, a risk assessment to determine the minimum amount of disturbance possible.
- (D11) Details of any significant disturbance to land in or within 200m of Endangered or Of Concern regional ecosystems, along with a record of the assessment required by Conditions D2 and D3 must be kept and submitted to the administering authority upon request.
- (D12) If the assessment required by Conditions D2 and D3 indicates that an ecosystem mapped as Endangered or Of Concern regional ecosystem by the Queensland Herbarium should be in a lower conservation value classification and the holder of this environmental authority wishes to undertake activities as if the ecosystem is of the lower conservation value they must notify the administering authority in writing before any significant disturbance to land takes place.
- (D13) If, within the 20 business days following the lodgement of the notification under Condition D12 the administering authority notifies the holder of this environmental authority, in writing, that the regional ecosystem mapping requires further validation, then significant disturbance to land in the mapped regional ecosystem are prohibited until the administering authority provides written advice that significant disturbance to land may proceed.
- (D14) When requested by the administering authority, the environmental authority holder must enter into an agreement with the administering authority to provide an environmental offset to counterbalance the impacts of the activity on Endangered or Of Concern regional ecosystem.
- (D15) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.

Disturbance to land – state forests and timber reserves

- (D16) Despite condition D8, activities may be undertaken within State Forests or Timber Reserves provided the holder of the environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.
- (D17) Where activities are to be undertaken in a State Forest or Timber Reserve that are also Endangered or Of Concern Regional Ecosystems, such activities may be undertaken in accordance with condition D10 of this environmental authority, provided the holder of this environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.

Soil management

- (D18) The holder of this environmental authority must develop and implement soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:
 - (a) establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients)
 - (b) a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter
 - (c) identify soil units within areas to be disturbed by petroleum activities at a scale of 1:100000, in accordance with the “*Guidelines for Surveying Soil and Land Resources, 2nd Edition*” (McKenzie *et al.* 2008), “*Australian Soil and Land Survey Handbook, 3rd Edition*” (National Committee on Soil and Terrain 2009) and “*The Australian Soil Classification*” (Isbell 2002)
 - (d) develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - i. shallow cracking clay soils
 - ii. deep cracking clay soils

- iii. deep saline and/or sodic cracking clay soils with melonholes;
- iv. thin surface, sodic duplex soils
- v. medium to thick surface (say >15 cm), sodic duplex soils; and
- vi. non-sodic duplex soils
- (e) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity
- (f) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

(D19) A copy of the soils management procedures must be made available to the administering authority upon request.

Acid sulfate soils

(D20) The holder of this environmental authority must, when clearing in areas with acid sulfate soils, develop and implement an acid sulfate soil environmental management plan prepared in accordance with the “*State Planning Policy 2/02 Guideline Planning and Managing Development Involving Acid Sulfate Soils*” and the Department of Environment and Resource Management’s “*Queensland Acid Sulphate Soil Technical Manual*” (Version 2.2 September 2004) or more recent editions or supplements to these documents as such become available.

Note: condition D20 is only applicable in areas of acid sulfate soils or potential acid sulfate soils. These areas should be identified in the Environmental Management Plan accompanying the application.

Fauna management

(D21) The holder of this environmental authority must develop and implement fauna management procedures for the carrying out of the petroleum activities, in particular pipeline construction, construction and use of dams, to prevent or minimise harm or the potential risk of causing harm to fauna.

(D22) The fauna management procedures must include training and awareness of staff and contractors and ensure that any planned fauna handling is undertaken by a suitably qualified person.

(D23) A copy of the fauna management procedures must be made available to the administering authority on request.

Note: The procedures required by conditions D21 and D22 should consider the “Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines” dated October 2005, or subsequent versions thereof.

Pest management

(D24) In carrying out the petroleum activity(ies) the holder of this environmental authority must develop and implement an effective pest management program that includes but is not limited to the following:

- (a) identification of pest species and infestation areas
- (b) prevents and/or minimises the introduction and/or spread of pests
- (c) control and management of pest outbreaks as a result of petroleum activities.

(D25) A copy of the pest management program must be made available to the administering authority on request.

Note: The pest management program required by Condition D24 should consider the “Petroleum Industry (including coal seam methane gas) Minimising Pest Spread Guidelines” dated June 2008, or subsequent versions thereof. This document is available for download from:

http://www.dpi.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Minimising-Pest-Spread-Advisory-Guidelines.pdf



Chemical and fuel storage

- (D26) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids (including petroleum products and associated piping and infrastructure) must be stored and handled in accordance with the relevant Australian Standard where such is available.
- (D27) Notwithstanding the requirements of any Australian Standard, any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- (a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110 per cent of a single storage tank or 100 per cent of the largest storage tank plus 10 per cent of the second largest storage tank in multiple storage areas
 - (b) drum storages must be bunded so that the capacity and construction of the bund is sufficient to contain at least 25 per cent of the maximum design storage volume within the bund.
- (D28) All containment systems must be designed to minimise rainfall collection within the system.

SCHEDULE E—ENVIRONMENTAL NUISANCE

Odour, dust and other airborne contaminants

- (E1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activity must not cause an environmental nuisance at any sensitive receptor.

Noise

- (E2) In the event of a complaint about noise from a petroleum activity made to the administering authority (and the administering authority considers the complaint is not frivolous nor vexatious nor based on mistaken belief) the emission of noise from the petroleum activity must not exceed the levels specified in Schedule E, Table 1 – Noise limits for fixed activities or Schedule E, Table 2 – Noise limits for itinerant, construction and drilling activities when measured at the sensitive receptor.
- (E3) In the event of a complaint about noise nuisance (that the administering authority considers the complaint is not frivolous or vexatious) the holder of the environmental authority must prepare and submit a noise management plan to the administering authority within 14 days from notification by the administering authority.
- (E4) The noise management plan must address, but not be limited to, the following matters:
- a) identification of component noise sources and activities at the place(s) which impact on noise sensitive receptor;
 - b) the measured and/or predicted noise level of these noise sources and activities at noise sensitive receptor;
 - c) the reasonable and practicable control or abatement measures (including hours of operation) that can be undertaken to reduce identified intrusive noise sources;
 - d) the reduction in noise level at noise sensitive receptors following the implementation of noise measures in c) above;
 - e) the method of handling of future noise complaints;
 - f) community liaison and consultation; and
 - g) training of staff and contractors in noise management practices.
- (E5) The holder of this environmental authority must commence implementation of the recommendations of the noise management plan not more than 30 days following its submission to the administering authority, accounting for any comments made by the administering authority within that time.

Table 1—Noise limits for fixed activities

Noise sensitive receptor			
Noise level dB(A) measured as:	7am to 6pm	6pm to 10pm	10pm to 7am
L _{Aeq} , adj, 15 mins	35	30	25
L _{A1} , adj, 15 mins	40	35	25

Table 2—Noise limits for itinerant, construction and drilling activities

Noise sensitive receptor			
Noise level dB(A) measured as:	7am to 6pm	6pm to 10pm	10pm to 7am
L _{Aeq} , adj, 15 mins	40	30	25
L _{A1} , adj, 15 mins	45	35	25

- (E6) Upon completion of the control or abatement measures contained in the noise management plan, the holder of this environmental authority must undertake verification noise measurement and not more than 30 days following such assessment of the noise submit to the administering authority noise report confirming compliance with noise limits in Schedule E Table 1 - Noise limits for fixed activities and/or Table 2 - Noise Limits for itinerant, construction and drilling activities when measured at the sensitive receptor.

Low Frequency Noise

- (E7) Notwithstanding condition E2, emission of any noise below 200 Hz must not cause an environmental nuisance.
- (E8) Low frequency noise from the petroleum activities is NOT considered to be a nuisance under condition (E7) if monitoring a sensitive receptor shows that noise emissions do not exceed the following limits:
- 50 dB(Z) measured inside the noise sensitive place or commercial place; and
 - the difference between the internal A-weighted and Z-weighted noise levels is no greater than 15 dB.

Blasting activities

- (E9) All blasting must be carried out in a proper manner by a competent person in accordance with best practice environmental management and Australian Standard 2187 to minimise the likelihood of any adverse effects being caused by air blast overpressure and/or ground borne vibrations at any sensitive or commercial place.
- (E10) Noise from blasting operations must not exceed an air blast overpressure level, when measured at or extrapolated to any noise sensitive or commercial place, of 115 dB (linear



peak) for nine (9) out of any ten (10) consecutive blasts initiated nor 120 dB (linear peak) at any time.

- (E11) Ground-borne vibration peak particle velocity caused by blasting operations, when measured at or extrapolated to any noise sensitive or commercial place, must not exceed more than 5 mm per second for nine (9) out of any ten (10) consecutive blasts initiated, nor 10 mm per second at any time.

Blast and vibration monitoring

- (E12) Should complaints about blasting and/or vibration be received or when requested by the Administering Authority, monitoring and recording of air blast overpressure and ground borne vibration (as relevant to the complaint) must be undertaken to investigate any complaint of nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
- maximum instantaneous charge
 - location of the blast within the site (including any bench level)
 - air blast overpressure level (dB Linear Peak)
 - peak particle velocity (mms-1)
 - location, date and time of recording
 - measurement instrumentation and procedure
 - meteorological conditions for blast monitoring (including temperature, relative humidity, temperature gradient, cloud cover, wind speed and direction)
 - distance/s from blast site to potentially noise-affected building/s or structure/s.

SCHEDULE F—AIR

Fuel burning or combustion equipment

- (F1) Contaminants emitted from fuel burning or combustion equipment point sources must be directed vertically upwards.
- (F2) Air dispersion modelling must be used to calculate the ground level concentrations of emissions from fuel burning or combustion equipment (that is capable of burning at least 500kg of fuel in an hour) and identify any potential impacts to air quality within the study area. The results must be made available to the administering authority on request.
- (F3) The calculated ground level concentration of contaminants discharged to the atmosphere under maximum operating conditions must not exceed the criteria in Schedule F - Table 1 for each air contaminant.
- (F4) Prior to the installation of any new or additional fuel burning or combustion equipment following the issue of this environmental authority, the holder must ensure that proper and effective pollution control equipment is provided for in the design of the equipment to ensure that emissions as modelled in accordance with Condition (F2) demonstrate compliance with the criteria specified in Schedule F, Table 1 – Maximum Ground Level Concentration Criteria.

Schedule F, Table 1—Maximum ground level concentration criteria

Contaminant	Concentration at 0°celsius	Units	Averaging time
NOx as nitrogen dioxide	250	µg/m ³	1 hour
NOx as nitrogen dioxide	33	µg/m ³	1 year
Carbon monoxide	11	mg/m ³	8 hour

- (F5) The holder of this environmental authority must maintain a register of fuel burning or combustion equipment that must include, as a minimum, the following information for each of the equipment:
- (a) fuel Burning or Combustion Equipment Name and Location
 - (b) stack emission height (metres)
 - (c) minimum efflux velocity (metres /sec)
 - (d) mass emission rates (g/s)
 - (e) contaminant concentrations (mg/Nm³ @ x per centO₂ dry gas at 0°Celsius and 1 atmosphere).
- (F6) The holder of this environmental authority must ensure that the information contained in the register of fuel burning or combustion equipment is complete and current on any given day.
- (F7) All entries in the register of fuel burning or combustion equipment must be certified by the chief executive officer for the tenure holder, or their delegate, as being accurate and correct.
- (F8) The holder of this environmental authority must make the register of fuel burning or combustion equipment or information contained in the register available to the administering authority on request.

Fuel burning and/or combustion equipment conditions for hubs and/or places close to populated areas as well as other low risk sites where such equipment is to be located

Refer Appendix 4 for conditions for fuel burning in hubs or close to populated areas.

SCHEDULE G—WASTE

General

- (G1) All general waste must be removed from the site and sent to a recycling facility or disposal facility licensed to accept the waste.
- (G2) All regulated waste must be removed from the site by a person who holds a current authority to transport such waste under the provisions of the EP Act and sent to a recycling facility or disposal facility licensed to accept the waste.
- (G3) Waste must not be burned or allowed to be burned on the licensed site.
- (G4) All waste fluids and muds resulting from drilling and exploration activities must be contained in a dam or containment structure for disposal, remediation or reuse where applicable.
- (G5) Oil based drilling muds must not be used in the carrying out of the petroleum activity.
- (G6) Synthetic based drilling muds must not be used in the carrying out of the petroleum activity other than with the written approval of the administering authority.

Coal seam gas water management

- (G7) The holder of this environmental authority must develop and implement a coal seam gas water management plan (CWM Plan) for the authorised petroleum activities which must adequately identify and quantify all CSG water generated under this environmental authority and propose management options for treating and/or disposing of or beneficially reusing CSG water.
- (G8) The holder of this environmental authority must ensure that coal seam gas water is contained, is not released to land or waters and is only used for purposes specifically authorised:
- (a) under this environmental authority, or
 - (b) under Section 186 of the *Petroleum and Gas (Production and Safety) Act 2004*; or



- (c) under Section 86 of the *Petroleum Act 1923*, or
- (d) under an approval of resource for beneficial use as provided for under the *Environmental Protection Act 1994*.

- (G9) The holder of this environmental authority must ensure that the coal seam gas water to be used for domestic or stock purposes meets the ANZECC 2000 Water Quality Guidelines, or subsequent versions thereof, for stock and domestic purposes.
- (G10) Coal seam gas water released to the environment in accordance with Condition (G8) must not have any properties that could cause, nor contain any contaminants in concentrations that are capable of causing environmental harm.
- (G11) Where any inconsistency exists between the conditions of this environmental authority and the CWM Plan, the conditions of this environmental authority prevail.

Note: CSG water that is beneficially used under an approval issued under the Environmental Protection (Waste Management) Regulation 2000 will be regulated under the conditions of that approval.

Associated water use for dust suppression

- (G12) CSG water produced from the authorised petroleum activities may be used for dust suppression within tenures covered by this environmental authority, provided the water quality meets the limits specified in Schedule G, Table 1 – Road dust suppression water contaminant release limits for each of the water quality characteristics.

Schedule G, Table 1—Road dust suppression water contaminant release limits.

Water quality characteristics	Unit	Limit	Limit type
pH	ph units	6.0 to 9.0	range
Total suspended solids	mg/L	30	maximum
Total dissolved salts	mg/L	2000	maximum
Total petroleum hydrocarbons	mg/L	10	maximum

- (G13) Use of CSG water for dust suppression activities must be carried out in a manner that:
 - (a) vegetation is not damaged
 - (b) soil erosion and soil structure damage is avoided
 - (c) there is no surface damming of the CSG water
 - (d) minimises deep drainage below the root zone of any vegetation
 - (e) quality of shallow aquifers is not adversely affected
 - (f) there are no releases of CSG waters to any surface waters.

Salt management

Refer Appendix 5 for conditions for brine or salt reuse or disposal.

SCHEDULE H—REHABILITATION

- (H1) The holder of this environmental authority must not abandon any dam but must decommission each dam so as to prevent and/or minimise any environmental harm.
- (H2) As a minimum, decommissioning must be conducted such that each dam either:
 - (a) becomes a stable landform similar to that of surrounding undisturbed areas, that no longer contains substances that will migrate into the environment, or

- (b) is approved or authorised by the administering authority for use by the landholder following cessation of the petroleum activities.
- (H3) Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associated with the petroleum activities.
- (H4) As soon as practicable but no later than 12 months (or longer period agreed in writing by the administering authority) after the end of petroleum activities causing significant disturbance to land, the holder of the authority must:
- (a) remediate contaminated land (e.g. dams containing salt)
 - (b) reshape all significantly disturbed land to a stable landform similar to that of surrounding undisturbed areas
 - (c) on all significantly disturbed land, take all reasonable and practicable measures to:
 - i. re-establish surface drainage lines
 - ii. reinstate the top layer of the soil profile
 - iii. promote establishment of vegetation.
 - (d) undertake rehabilitation in a manner such that any actual and potential acid sulfate soils in or on the site are either not disturbed, or submerged, or treated so as to not be likely to cause environmental harm
 - (e) decommission all inactive buried pipelines in accordance with the requirements of AS 2885 and ensuring that there will not be any subsequent subsidence of land along the pipeline route.
- (H5) All significantly disturbed land caused by the carrying out of the petroleum activities must be rehabilitated to:
- (a) a stable landform and with a self-sustaining vegetation cover and species that are similar to adjoining undisturbed areas
 - (b) ensure that all land is reinstated to the pre-disturbed land use and suitability class
 - (c) ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities
 - (d) ensure that the water quality of any residual void or water bodies constructed by petroleum activities meets criteria for subsequent uses and does not have potential to cause environmental harm.
- (H6) Maintenance of rehabilitated areas must take place to ensure and demonstrate:
- (a) stability of landforms
 - (b) erosion control measures remain effective
 - (c) stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters
 - (d) plants show healthy growth and recruitment is occurring
 - (e) rehabilitated areas are free of any declared pest plants.
- (H7) Rehabilitation can be considered successful when:
- (a) the site can be managed for its designated land-use (e.g. similar to that of surrounding undisturbed areas)
 - (b) no greater management input than for other land in the area being used for a similar purpose is required and there is evidence that the rehabilitation has been successful for at least three (3) years
 - (c) the rehabilitation is carried out in accordance with the goals, objectives indicators and completion criteria as specified in Schedule H, Table 1—Planned rehabilitation specifications
 - (d) written agreement is obtained from the landowner/holder and administering authority.



Schedule H, Table 1—Planned rehabilitation specifications

Petroleum activity feature	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
	1. Safe	Site safe for humans and animals	(a) Landform re-established	(a) No subsidence or major erosion gullies
	2. Non-polluting	Sediment and erosion control structures in place	(a) Sediment traps and design of erosion control measures	(a) Certification from suitably qualified and experience person and performance of control structures
		Storm water runoff does not pollute nearby watercourses	(b) Surface water monitoring	(b) Monitoring meeting release limits
		Encapsulated salt does not seep outside the monocell	(c) Groundwater monitoring	(c) Monitoring shows no adverse impacts on groundwater quality
	3. Stable	Minimise erosion	(a) Re-establish surface drainage lines (b) Vegetation cover	(a) no subsidence or areas of major erosion for at least x ¹⁷¹ years (b) x per cent foliage cover recorded over a period of 3 years
	4. Self-sustaining	Describe post activity land use or land suitability or land capability	(a) Species diversity (b) Presence of key species	(a) Certification that x per cent species diversity achieved and maintained for x years (b) Certification that key species present over a period of x years

SCHEDULE I—MONITORING PROGRAMS

General

- (11) The holder of this environmental authority must develop and implement a monitoring program, the result of which will demonstrate compliance with the conditions of this environmental authority.
- (12) All monitoring under this environmental authority must be conducted by a suitably qualified person.
- (13) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this environmental authority must be calibrated, and operated and maintained effectively.

¹⁷¹ The variables x, xx, xxx refer to parameters to be determined for each individual project by DERM for EA approval

- (14) The method of water sampling required by this environmental authority must comply with that set out in the most recent version of the *Monitoring and Sampling Manual – Environmental Protection (Water) Policy* published by the administering authority.
- (15) All determinations of water quality must be:
- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements
 - b) made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management - Water Quality Sampling Manual; and
 - c) collected from the monitoring locations identified within this environmental authority, within XX hours of each other where possible
 - d) carried out on representative samples.

Note: this condition requires the Monitoring and Sampling Manual – Environmental Protection (Water) Policy 2009 to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

- (16) All analyses and tests required to be conducted under this environmental authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.
- (17) If monitoring conducted in accordance with this environmental authority indicated a condition or contaminant level that has caused, or has potential to cause, environmental harm, the environmental authority holder must:
- a) as soon as is practicable, take the necessary actions to rectify the condition or contaminant level so as to avoid or minimise environmental harm; and
 - b) notify the administering authority of the condition or contaminant level and the actions taken to rectify it.
- (18) Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority must be reviewed for performance and amended if required on an annual basis.
- (19) The holder of this environmental authority must record, compile and keep for a minimum of five years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority.
- (110) An annual monitoring report must be prepared each year and presented to the administering authority when requested. This report shall include but not be limited to:
- a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this environmental authority and, a comparison of the previous twelve (12) months monitoring results to both the limits set in this environmental authority and to relevant prior results
 - b) an evaluation/explanation of the data derived from any monitoring programs; and
 - c) a summary of any record of quantities of releases required to be kept under this environmental authority
 - d) an outline of actions taken or proposed to minimise the risk of environmental harm from any condition or elevated contaminant level identified by the monitoring or recording programs.

Groundwater monitoring

- (111) The holder of this environmental authority must prepare and implement a groundwater monitoring program within 40 business days of this environmental authority taking effect.
- (112) The groundwater monitoring program must be developed and implemented by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater sampling design.



- (113) The groundwater monitoring program must be able to detect any significant risks and changes to groundwater quality due to activities authorised under this environmental authority. As a minimum the program must include:
- (a) a groundwater monitoring network designed and installed for the authorised petroleum activities
 - (b) a sufficient number of monitoring sites to provide information on the following:
 - (i) seepage to groundwater and surrounding soils from any regulated dam authorised under this environmental authority and its effect on groundwater and soils
 - (ii) background monitoring sites (i.e. groundwater quality in representative bore(s) that have not been affected by the activities authorised under this environmental authority).
 - (c) the location of monitoring points, parameters to be measured, frequency of monitoring, monitoring methodology used, trigger values
 - (d) the development of procedures to establish background ground water quality.
- (114) The Groundwater Monitoring Program must provide for monitoring of groundwater quality as often as necessary to detect impacts of the petroleum activities authorised under this environmental authority, but not less frequently than biannually (every six months) for the first year of carrying out the petroleum activities and annually thereafter.
- (115) If groundwater contamination caused by the petroleum activities is encountered, the following must be considered to satisfy requirements under Condition (I17):
- (a) the level of environmental harm caused as a result of such contamination to soils and groundwater
 - (b) the conduct of a geodetic survey of all monitoring bores to determine the relative water surface elevations of each bore and reported in metres relative to the Australian Height Datum
 - (c) the determination of groundwater flow direction, groundwater flow rate and hydraulic conductivity.
- (116) The holder of this environmental authority must ensure that the groundwater monitoring data gathered in accordance with this environmental authority is analysed and interpreted to assess the nature and extent of any environmental impact of the environmentally relevant activity. The data, analysis and assessment must be submitted to the administering authority with each Annual Return.
- (117) If groundwater monitoring indicates that any significant changes in groundwater quality caused by petroleum activities are detected, then information must be submitted to the administering authority within 10 business days of receipt of the analysis indicating these changes, including any proposed actions to mitigate the changes in groundwater quality..

Air monitoring (point source)

- (118) The holder of this environmental authority must conduct a monitoring program of contaminants released to the atmosphere at each release point recorded in the Register of Fuel Burning or Combustion Equipment (Condition F5) for the contaminants listed in Schedule F – Table 1 (release of contaminants) and at the frequencies specified in Schedule I – Table 1.

Schedule I, Table 1—Monitoring frequency for contaminants

Contaminant	Monitoring frequency
NOx as Nitrogen Dioxide	To be inserted
NOx as Nitrogen Dioxide	To be inserted
Carbon monoxide	To be inserted

- (119) The monitoring program must comply with the following:

- (a) Monitoring provisions for the release points must comply with the most recent edition of AS4323.1 Stationary source emissions method 1: Selection of sampling provisions.
- (b) The following tests must be performed for each sample taken at each release point specified in the Register of Fuel Burning or Combustion Equipment (Condition F5):
 - i. Gas velocity, volume and mass flow rate.
 - ii. Temperature.
 - iii. Water vapour concentration (for non-continuous sampling).
- (c) Samples taken must be representative of the contaminants discharged when operating under maximum operating conditions.
- (d) During the sampling period the following additional information must be gathered:
 - i. Production rate.
 - ii. Plant status.
- (e) Monitoring of contaminant release must be carried out in accordance with the latest edition of the administering authority's Air Quality Sampling Manual.

Noise monitoring

- (120) The holder of this environmental authority must undertake noise monitoring when requested by the administering authority to investigate a complaint of environmental nuisance at a sensitive or commercial place within the reasonable and practicable timeframe nominated by the administering authority, and report the results to the administering authority within 3 business days of completion of the monitoring.
- (121) Noise monitoring and recording must include the following descriptor, characteristics and matters:
 - (a) $L_{AN,T}$ (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins).
 - (b) background noise $L_{A90,T}$.
 - (c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels.
 - (d) atmospheric conditions including temperature, relative humidity and wind speed and directions.
 - (e) effects due to any extraneous factors such as traffic noise.
 - (f) location, date and time of monitoring.
 - (g) if the complaint concerns low frequency noise, $\text{Max } L_{PZ,15 \text{ min}}$.
 - (h) If the complaint concerns low frequency noise, one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range for both the noise source and the background noise in the absence of the noise source.
- (122) The method of measurement and reporting of noise levels and background sound pressure levels must comply with the latest edition of the administering authority's *Noise Measurement Manual* or the most recent version of AS1055 Acoustics – description and measurement of environmental noise.

Nuisance monitoring (other than noise)

- (123) When the administering authority advises the holder of this environmental authority of a complaint alleging nuisance other than noise, the holder must investigate the complaint and advise the administering authority in writing of the action proposed or undertaken to resolve the complaint.
- (124) When requested by the administering authority, the holder of this environmental authority must undertake monitoring as specified by the administering authority, within a reasonable and practical timeframe nominated by the administering authority to investigate any complaint of environmental harm at any sensitive or commercial place.
- (125) The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within 10 business days of completion of the investigation, or receipt of the monitoring results, whichever is the latter.



- (I26) If monitoring in accordance with Condition I24 and I25, indicates that emissions exceed the limits set in this environmental authority or are causing environmental nuisance, then the holder of this environmental authority must:
- (a) address the complaint including the use of alternative dispute resolution services if required, and/or
 - (b) as soon as practicable implement abatement or attenuation measures so that light, dust, particulate or odour emissions from the authorised activities do not result in further environmental nuisance.

SCHEDULE J—COMMUNITY ISSUES

- (J1) The holder of this environmental authority must maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
- (J2) The holder of this environmental authority must record the following details for all complaints received and provide this information to the administering authority on request:
- (a) name, address and contact number for complainant
 - (b) time and date of complaint
 - (c) reasons for the complaint as stated by the complainant
 - (d) investigations undertaken in response to the complaint
 - (e) conclusions formed
 - (f) actions taken to resolve complaint
 - (g) any abatement measures implemented to mitigate the cause of the complaint
 - (h) name and contact details of the person responsible for resolving the complaint.
- (J3) The holder of this environmental authority must retain the record of complaints required by this condition for five (5) years.

SCHEDULE K—NOTIFICATION PROCEDURES

- (K1) The holder of this environmental authority must telephone the administering authority's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants not in accordance with the conditions of this environmental authority or any event where environmental harm has been caused or may be caused.
- (K2) Subject to condition (K1), the holder of this environmental authority is required to report in the case of uncontained spills of contaminants (including but not limited to hydrocarbon, CSG water or mixtures of both) of the following volumes or kind:
- (a) releases of any volume of contaminants to water
 - (b) releases of volumes of contaminants greater than 200L of hydrocarbon, 2000 litres of brine or 10 000 litres of coal seam gas water to land
 - (c) releases of any volumes of contaminants where potential serious or material environmental harm has occurred or may occur.
- (K3) The notification of emergencies or incidents as required by conditions number (K1 and K2) must include but not be limited to the following information:
- (a) the environmental authority number and name of the holder
 - (b) the name and telephone number of the designated contact person
 - (c) the location of the emergency or incident
 - (d) the date and time of the release
 - (e) the time the holder of this environmental authority became aware of the emergency or incident
 - (f) the estimated quantity and type of any substances involved in the incident;
 - (g) the actual or potential suspected cause of the release
 - (h) a description of the effects of the incident including any environmental harm that has occurred or may occur as a result of the release
 - (i) any sampling conducted or proposed, relevant to the emergency or incident

- (j) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (K4) Within 10 business days following the initial notification of an emergency or incident or receipt of monitoring results, whichever is the later, a written report must be provided to the administering authority, including the following:
- (a) results and interpretation of any samples taken at the time of the incident and analysed
 - (b) the outcomes of actions taken at the time of the incident to prevent or minimise environmental harm
 - (c) proposed actions to prevent a recurrence of the emergency or incident.
- (K5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the emergency or incident, which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, a written report on the results of any such monitoring must be provided to the administering authority.

SCHEDULE L—DEFINITIONS

Note: *Where a term is not defined in this environmental authority the definition in the Environmental Protection Act 1994, its regulations and Environmental Protection Policies or the Petroleum and Gas (Production and Safety) Act 2004 and its regulations must be used in that order.*



Definitions

"aggregation dam" means a dam that is used to aggregate and contain CSG water prior to use, treatment or disposal of that water (by means other than evaporation). The primary purpose of the dam must not be to evaporate the water even though this will naturally occur.

"associated works" in relation to a dam, means:

- operations of any kind and all things constructed, erected or installed for that dam; and
- any land used for those operations.

"background noise level" means the sound pressure level, measured in the absence of the noise under investigation, as the L A90,T being the A-weighted sound pressure level exceeded for 90 percent of the measurement time period T of not less than 15 minutes, using Fast response.

"bed and banks" for a watercourse or wetland means land over which the water of the watercourse or wetland normally flows or that is normally covered by the water, whether permanently or intermittently; but does not include land adjoining or adjacent to the bed or banks that is from time to time covered by floodwater.

"beneficial use" means

- with respect to dams, that the current or proposed owner of the land on which a dam stands, has found a use for that dam that is:
 - of benefit to that owner in that it adds real value to their business or to the general community,
 - in accordance with relevant provisions of the *Environmental Protection Act 1994*,
 - sustainable by virtue of written undertakings given by that owner to maintain that dam, and
 - the transfer and use have been approved or authorised under any relevant legislation.Or
- with respect to coal seam gas water, refer the DERM's Operational Policy *Management of water produced in association with petroleum activities (CSG water)* and *Notice of decision to approve a resource for beneficial use – CSG water* which can be accessed on DERM's website at www.derm.qld.gov.au.

"brine" means either saline water with a total dissolved solid concentration greater than 40 000mg/l or CSG water after it has been concentrated through water treatment processes and/or evaporation.

"bund or banded" in relation to spill containment systems for fabricated or manufactured tanks or containers designed to a recognised standard means an embankment or wall of brick, stone, concrete or other impervious material which may form part or all of the perimeter of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or banded area) is sometimes colloquially referred to within industry as the bund. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

"category A ESA" means any area listed in Section 25 of the *Environmental Protection Regulation 2008*.

"category B ESA" means any area listed in Section 26 of the *Environmental Protection Regulation 2008*.

"category C ESA" means any of the following areas:

- nature refuges as defined under the *Nature Conservation Act 1992*;
- koala habitat areas as defined under the *Nature Conservation Act 1992*;
- state forests or timber reserves as defined under the *Forestry Act 1959*;
- declared catchment areas under the *Water Act 2000*;
- resources reserves under the *Nature Conservation Act 1992*
- an area identified as "Essential Habitat" for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*;
- any wetland shown on the Map of Referable Wetlands available from DERM's website; or

- ‘of concern’ regional ecosystems identified in the database maintained by DERM called ‘Regional ecosystem description database’ containing regional ecosystem numbers and descriptions.

“**certification or certified by a suitably qualified and experienced person**” in relation to a design plan or an annual report regarding dams, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what is being certified and the precise nature of that certification
- the relevant legislative, regulatory and technical criteria on which the certification has been based
- the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts
- the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

“**clearing**” means:

- in relation to grass, scrub or bush—the removal of vegetation by disturbing root systems and exposing underlying soil (including burning), but does not include
 - the flattening or compaction of vegetation by vehicles if the vegetation remains living; or
 - the slashing or mowing of vegetation to facilitate access tracks; or
 - the clearing of noxious or introduced plant species; and
- in relation to trees—cutting down, ringbarking, pushing over, poisoning or destroying in any way.

“**commercial place**” means a work place used as an office or for business or commercial purposes, which is not part of the petroleum activities and does not include employees accommodation or public roads.

“**construction**” in relation to a dam includes building a new dam and modifying or lifting an existing dam.

“**construction activities**” mean activities required for the construction of petroleum infrastructure (fixed plant, pipelines, accommodation camps, earthworks, access roads, dams etc)

“**CSG water**” means groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production. CSG water typically contains significant concentrations of salts, has a high sodium adsorption ratio (SAR) and may contain other contaminants that have the potential to cause environmental harm if released to land or waters through inappropriate management. CSG water is a waste, as defined under s13 of the EP Act.

“**CSG water dams**” include any type of dam (storage or evaporation) used to contain groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production.

“**dam**” means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. A dam does *not* mean a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container.

“**design plan**” means the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include ‘as constructed’ drawings.



“discharge area” means:

- (a) that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater, and
- (b) identified by an assessment process consistent with the document: Salinity Management Handbook, Queensland Department of Natural Resources, 1997, or
- (c) identified by an approved salinity hazard map held by the Department of Environment and Resource Management.

“drilling activities” mean the use of drill rigs to drill wells, driving casing, downhole pump and equipment in each well, pumping water and mud wastes, and operation of generators.

“ecosystem functioning” means the interactions between and within living and nonliving components of an ecosystem and generally correlates with the size, shape and location of an area of vegetation.

“end” means the stopping of the particular activity that has caused a significant disturbance in a particular area. It refers to, among other things, the end of a seismic survey or the end of a drilling operation. It does not refer to the end of all related activities such as rehabilitation. In other words, it does not refer to the ‘completion’ of the petroleum activity, the time at which the petroleum authority ends or the time that the land in question ceases to be part of an authority.

“equivalent person or EP” means an equivalent person under volume 1, section 2 of the *Guidelines for Planning and Design of Sewerage Schemes*, October 1991, published by the Water Resources Commission, Department of Primary Industries, Fisheries and Forestry.

“evaporation dam” means a dam where CSG water or brine is contained until the water content has been removed by evaporation.

“fill” means any kind of material in solid form (whether or not naturally occurring) capable of being deposited at a place but does not include material that forms a part of, or is associated with, a structure constructed in a watercourse, wetland or spring including a bridge, road, causeway, pipeline, rock revetment, drain outlet works, erosion prevention structure or fence.

“fixed activities” mean field and process compressor plants, well, operations, longer term flaring (>14 days), pumps, water treatment plants, power plants and other fixed infrastructure required to conduct petroleum activities.

“flowable substance” means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

“foreseeable future” means the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptably low probability of failure before that time.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in *DERM’s Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“**heritage place**” means any place that may be of cultural heritage significance, or any place with potential to contain archaeological artefacts that are an important source of information about Queensland’s history.

“**high bank**” means the defining terrace or bank or, if no bank is present, the point on the active floodplain, which confines the average annual peak flows in a watercourse.

“**highly erodible soils**” means very unstable soils that are generally described as Sodosols with hard –setting, fine sandy loam to silty clay loam surfaces (solodics, solodised solonetz and solonetz) or soils with a dispersible layer located less than 25cm deep or soils less than 25cm deep.

“**hydraulic performance**” means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* published by the Environmental Protection Agency on its website.

“**impulsive sound**” means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.

“**infrastructure**” means water storage dams, roads and tracks, equipment, buildings and other structures built for the purpose and duration of the conduct of the petroleum activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams (e.g. evaporation dams), pipelines and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of the land.

“**itinerant activities**” mean activities that are carried out at various locations using transportable plant or equipment and carried out at one (1) location and for less than fourteen (14) consecutive days and on more than two (2) occasions in each calendar year..

“**lake**” means:

- (a) a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
- (b) the bed and banks and any other element confining or containing the water.

“**landfill monocell**” means a specialised, isolated landfill facility where a single specific waste type is exclusively disposed (i.e. salt).

“**leachate**” means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of on site which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

“**levee**” means a dyke or bund that is designed only to provide for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from unplanned releases from other works of infrastructure, during the progress of those stormwater or flood flows or those unplanned releases; and does not store any significant volume of water or flowable substances at any other times.

“**limited petroleum activities**” mean activities including geophysical surveys (including seismic activities), well sites, well pads, sumps, flare pits, flow lines and supporting access tracks. Limited petroleum activities do not include the construction of production infrastructure for processing or storing petroleum or by-products, dams, compressor stations, campsites/workforce accommodation, power supplies, waste disposal or other supporting infrastructure for the project.

“**max L_{PZ,15 min} min**” means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.

“**mg/L**” means milligrams per litre.



“overland flow water” means water, including floodwater, flowing over land, otherwise than in a watercourse or lake:

- after having fallen as rain or in any other way; or
- after rising to the surface naturally from underground.

“permanent infrastructure” includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads, pipelines etc), which is to be left by agreement with the landowner.

“pest” means species:

- (a) declared under the *Land Protection (Pest and Stock route Management) Act 2002*;
- (b) declared under Local Government model local laws; and
- (c) which may become invasive in the future.

“regulated dam” means any dam in the significant or high hazard category as assessed using the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“rehabilitation” means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land

“remnant unit” means a continuous area of remnant vegetation representative of a single Regional Ecosystem type or a single heterogeneous unit (multiple Regional Ecosystem types that cannot be distinguished individually due to the scale of mapping).

“River Improvement Trust Asset Area” means an area within a River Improvement Area declared under the *River Improvement Trust Act 1940* that is or has been subject to restoration or flood mitigation works. The locations and details of these areas can be obtained from the relevant River Improvement Trust.

“sensitive place” means

- a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel); or
- a library, childcare centre, kindergarten, school, university or other educational institution;
- a medical centre, surgery or hospital; or
- a protected area; or
- a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment.

“significantly disturbed land or significant disturbance to land” means disturbance to land as defined in section 28 of the *Environmental Protection Regulation 2008*.

“site” means the petroleum authority(ies) to which the environmental authority relates.

“spring” means the land to which water rises naturally from below the ground and the land over which the water then flows.

“stable” in relation to land, means landform dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

“state heritage place” means a place entered in the Queensland heritage register under Part 4 of the *Queensland Heritage Act 1992*.

“suitably qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“suitably qualified and experienced person” in relation to a hazard assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what has been assessed and the precise nature of that assessment
- the relevant legislative, regulatory and technical criteria on which the assessment has been based
- the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts
- the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

“suitably qualified and experienced person” in relation to dams means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the Professional Engineers Act 1988, OR registered as a National Professional Engineer (NPER) with the Institution of Engineers Australia, OR holds equivalent professional qualifications to the satisfaction of the administering authority for the Act; and the administering authority for the Act is satisfied that person has knowledge, suitable experience and demonstrated expertise in relevant fields, as set out below:

- knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry
- a total of five years of suitable experience and demonstrated expertise each, in three of the following categories:
 - investigation and design of dams
 - Construction, operation and maintenance of dams
 - hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology
 - hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes
 - hydrogeology with particular reference to seepage, groundwater
 - solute transport processes and monitoring thereof
 - dam safety.

“third party auditor” means a suitably qualified person who is either a certified third party auditor or an internal auditor employed by the holder of the environmental authority and the person is independent of the day to day management and operation of activities covered by this environmental authority

“threatening processes” means processes, features and actions that can have a detrimental effect upon the health and viability of an area of vegetation. For example altered hydrology, land use practices, invasion by pest and weed species, land degradation, edge effects and fragmentation.

“tolerable limits” means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing damage and limiting infiltration and percolation.

“topsoil” means the surface (top) layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300mm in depth from the natural surface.

“void” means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).

“waters” includes all or any part of a creek, river, stream, lake, lagoon, dam, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and underground water.



“**watercourse**” means a river, creek or stream in which water flows permanently or intermittently:

- (a) in a natural channel, whether artificially improved or not, or
- (b) in an artificial channel that has changed the course of the watercourse;
but, in any case, only:
- (c) unless a regulation under paragraph (d), (e) or (f) declares otherwise-at every place upstream of the point (point A) to which the high spring tide ordinarily flows and reflows, whether due to a natural cause or to an artificial barrier, or
- (d) if a regulation has declared an upstream limit for the watercourse-the part of the river, creek or stream between the upstream limit and point A, or
- (e) if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit, or
- (f) if a regulation has declared an upstream and a downstream limit for the watercourse-the part of the river, creek or stream between the upstream and the downstream limits.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

“**wetland**” means an area shown as a wetland on a ‘Map of referable wetlands’, a document approved by the chief executive (environment). A map of referable wetlands can be viewed at www.derm.qld.gov.au .

“**wild river declaration**” means a statutory instrument under the *Wild Rivers Act 2005*. A declaration lists the relevant natural values to be preserved and delineates certain parts of the wild river area and the different constraints that may apply in these areas. With reference to environmental authorities for petroleum, each declaration also specifies conditions to be included in a new authority if the activity is to be located within the wild river area.

“**80th percentile release limits**” means that not more than one (1) of the measured values is to exceed the stated release limit for any five (5) consecutive samples where:

- (1) the consecutive samples are taken over a 5 month period; and
- (2) the consecutive samples are taken at approximately equal periods.

APPENDICES OF CONDITIONS FOR DIFFERENT SCENARIOS

Note: Many of the actual numbers will be determined subsequent to the Coordinator-General's report

Appendix 1 Release to Waters of Treated or Good Quality Coal Seam Gas Water Conditions

Contaminant Release

(BA1) The release of contaminants to waters must only occur from the release points specified in Schedule BA, Table 1—Contaminant Release Points, Sources and Receiving Waters and depicted in Figure 1 <**this would be a plan locating all monitoring and release points**> attached to this environmental authority.

Schedule BA, Table 1: Contaminant release points, sources and receiving waters

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant source and location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	Treated CSG water from the RO plant	Outlet of discharge pipe to Wet Creek	Wet Creek
RP 2	XXXX	XXXX			

EXPLANATORY NOTES

Table 2 needs to be populated based on the discharge proposal, the spatial location and available background water quality information. Typically, a lesser number of indicators and limits will be required for event based releases. Similarly, more stringent limits will generally be required for a release to dry bed and banks, where this is shown to be a requirement of the approval. The values should be developed to ensure that downstream values are protected. For aquatic ecosystem protection, the limits will typically be based on achieving instream WQO's e.g. 20th and 80th percentiles of reference data (except in the case of conductivity which is based on 25th and 75th percentiles). This data may be sourced from the Queensland Water Quality guidelines or local reference data where available. Generic reference-based values for cations and anions will be made available by DERM based on historical monitoring results.

(BA2) The release of contaminants to waters must not exceed the release limits stated in Schedule BA, Table 2 when measured at the monitoring points specified in Schedule BA, Table 1 for each quality characteristic.

Schedule BA Table 2 – Contaminant Release Limits for release point X

Physicochemical parameters	Release limits	Limit type	Monitoring frequency
Electrical conductivity (µS/cm)	To achieve an instream value between the 25 th to 75 th percentile of relevant reference data	range	daily
pH (pH Unit)	6.5-9	range	daily
Dissolved oxygen (mg/L)	2	minimum	daily
Temperature (°C)	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	daily
Turbidity (NTU)	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	daily
Suspended solids (mg/L)	To achieve an instream value between the 80 th percentile of relevant reference data	maximum	weekly



Cations and anions (mg/L), these could include: calcium, fluoride and sulfate.	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	weekly
Other	Depending on source of CSG water, the level of treatment and the management regime		

(BA3) The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2.

Note: The following conditions are applicable when there needs to be monitoring of stream flow and the potential for the release to dominate downstream flow regimes (such as with release to ephemeral streams). Where flow monitoring occurs and the timing of the release is linked to measurements of instream flow, a receiving water flow trigger must be specified. The trigger will be used to signal a commencement and cessation of release. The flow trigger would usually be representative of the commencement of event flow rather than base flow and could be determined from historical flow monitoring or hydrological modelling. In other situations, a maximum release volume may be specified independent of stream flow rates.

Contaminant Release

(BA4) The holder must install, operate and maintain a stream flow gauging station(s) as specified in Table 3 to determine and record stream flows at the locations upstream of each release point(s) as shown in Table 1, for any receiving water into which a release occurs.

(BA5) Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 3 for the contaminant release point(s) specified in Table 1.

Schedule BA, Table 3—Contaminant Release during Flow Events

Receiving water description	Release point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum flow in receiving water required for a release event	Flow recording frequency
Wet Creek		Gauging station 1	XXXX	XXXX	The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Continuous (minimum daily)

(BA6) The volume released through the release point(s) must not exceed XX per cent of the measured upstream receiving water flow. <This will depend on hydrological assessment, historical flow events and the water quality release limits.>

OR

(BA7) The volume release through the release point(s) must not exceed XX m³/s and YY ML/day.

Note: only one of condition BA6 and BA7 will apply.

(BA8) The quantity of contaminants released from each release point must be measured and recorded at the monitoring point(s) in Table 1 and at the frequency specified in Table 2.

(BA9) Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

(BA10) The release of contaminants to waters must have ceased by XX <insert date as determined in the required risk assessment>.

Note: Condition B10 applies only to Hierarchy 5.

Characterisation of other contaminants

- (BA11) The environmental authority holder must undertake an <insert frequency> assessment of the contaminants of CSG water to determine the risk of environmental harm from release of CSG water to surface waters. This should consider the contaminants mentioned in the ANZECC and ARMCANZ 2000 guidelines.
- (BA12) If quality characteristics of the CSG water assessment, required by condition BA11, exceed any of the levels specified in Table 4 the environmental authority holder must:
- (a) notify the administering authority within 5 business days; and
 - (b) complete an investigation in accordance with the ANZECC and ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - i. details of the investigations carried out; and
 - ii. actions taken to prevent and/or minimise environmental harm.

Notification of release event exceedance

- (BA13) If the release limits defined in Schedule BA, Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.
- (BA14) The environmental authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this environmental authority, provide a report to the administering authority detailing:
- (a) the reason for the release;
 - (b) the location of the release;
 - (c) all water quality monitoring results;
 - (d) any general observations;
 - (e) all calculations;
 - (f) measures taken to prevent a repeat of the exceedance taking place; and
 - (g) any other matters pertinent to the water release event.

Receiving Environment Monitoring Program (REMP)

- (BA15) A REMP must be developed and implemented to monitor and record the effects of the release of contaminants on the receiving environment whilst contaminants are being discharged, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. For the purposes of the REMP the receiving environment is defined as the waters of the XX and connected waterways within XX (e.g. Xkm) downstream of the release.
- (BA16) The REMP must be maintained by a person possessing appropriate qualifications and experience in the field of hydrology and surface water monitoring program design.
- (BA17) The REMP must address but not be limited to the following points:
- (a) description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality)
 - (b) description of applicable environmental values, including but not limited to:
 - i. hydrology (flow, duration, periodicity, connectivity with groundwater systems;
 - ii. physiochemical properties;
 - iii. aquatic ecosystem parameters including flow and fauna habitat; and
 - iv. geomorphological features.
 - (c) description of water quality objectives to be achieved (i.e. as scheduled pursuant to the *Environmental Protection (Water) Policy 2009*);



- (d) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed;
- (e) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- (f) monitoring for any potential adverse environmental impacts caused by the release;
- (g) monitoring of stream flow and hydrology;
- (h) consideration of sodic soils and potential for water course bank slumping;
- (i) monitoring of contaminants should consider the limits specified in Schedule BA – Table 2 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC and ARM CANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- (j) monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation);
- (k) monitoring biological indicators (for macroinvertebrates in accordance with the AusRivAS methodology) and metals/metalloids in sediments (in accordance with ANZECC and ARM CANZ 2000, *A Guide To The Application Of The ANZECC and ARM CANZ Water Quality Guidelines In The Minerals Industry* (BATLEY et al) and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
- (l) the methods for analysis and interpretation all monitoring results;
- (m) the locations of monitoring points (including the locations of proposed background and downstream impacted sites for each release point);
- (n) the frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within two (2) years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2009*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- (o) specify sampling and analysis methods and quality assurance and control;
- (p) any historical data sets to be relied upon;
- (q) description of the statistical basis on which conclusions are drawn,
- (r) any control or reference sites; and
- (s) recording of planned and unplanned releases to watercourses, procedures for event monitoring, monitoring methodology used and procedure to establish background surface water quality.

(BA18) The REMP must be prepared and submitted in writing to the administering authority by XX.

Water Release Reduction Strategy

(BA19) As part of the CWMP the holder of the environmental authority must develop and implement an on-going Release Reduction Strategy to maximise CSG water use and minimise any release to waters from the XX and the storage of CSG water in holding dams. The strategy must address the following matters:

- (a) implementation of schemes to achieve maximum use of the water
- (b) specific targets for achieving increased use of CSG water both treated and untreated
- (c) a market analysis at least every three (3) years to identify existing and future opportunities for water use
- (d) on-going review of emerging technologies and/or re-use options that could achieve significant reductions in mass loads of contaminants released to the environment
- (e) investigation of the feasibility of alternative options, practices and procedures to further minimise the volume and concentration of contaminants released to waters
- (f) programs to implement feasible options to achieve increased water use and reduction in contaminant loads, including actions and timeframes for completion.

(BA20) A progress report on the Release Reduction Strategy must be submitted to the administering authority with each annual return. The report(s) must address at least the following matters:

- (a) details of the specific options, practices and procedures investigated
- (b) details of new practices, procedures and programs implemented since the last reporting period and targets met

- (c) where alternative options, practices and procedures are not considered feasible, the provision of justification to support that determination
- (d) details of the option(s) yet to be implemented, including the timeframes for implementation, and justification for the chosen option(s).

Water general

(BA21) The release of contaminants directly or indirectly to waters:

- (a) must not produce any visible discolouration of receiving waters, nor
- (b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual water monitoring reporting

(BA22) The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- (a) the date on which the sample was taken
- (b) the time at which the sample was taken
- (c) the monitoring point at which the sample was taken
- (d) the measured or estimated daily quantity of the contaminants released from all release points
- (e) the release flow rate at the time of sampling for each release point
- (f) the results of all monitoring and details of any exceedences with the conditions of this environmental authority
- (g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Note: Condition BA22 will be incorporated into Schedule I when this appendix is incorporated into the environmental authority.

Appendix 2—Sewage Treatment Plant <21 EP Conditions

- (BB1) The construction and operation of a sewage treatment works greater than 21 EP is prohibited under this environmental authority.
- (BB2) The disposal of sewage effluent must not cause environmental nuisance or material or serious environmental harm.

Appendix 3—Sewage Treatment Works >21 - 450 EP Conditions

Instruction: low risk

Comment: Sewage treatment works that have a total daily peak design capacity of at least 21 EP constitute an environmentally relevant activity under the Environmental Protection Act 1994. The following model conditions have been developed for those works with a peak design capacity of 21 to 450 EP and where:

- *the plant is designed to produce secondary treated effluent with disinfection;*
- *the effluent is irrigated on a dedicated area of land on the petroleum tenure;*
- *there is a buffer distance of at least 100 metres to any residential area, watercourse, wetland or protected area.*

Release of treated sewage effluent contaminants to land

- (BC1) Sewage pump stations must be fitted with a stand-by pump and a visible or audible high level alarm.
- (BC2) Treated effluent may only be released to land at the designated, fenced and delineated contaminant release area/s.



- (BC3) The contaminant release area/s must be maintained in a proper and efficient condition so as to provide adequate assimilation, percolation, evaporation and transpiration of the released contaminants.
- (BC4) Treated effluent must not be applied by spray irrigation and must be applied in a manner that does not cause damming or runoff of effluent beyond the contaminant release area/s.
- (BC5) When weather conditions or soil conditions preclude the release of contaminants, the contaminants must be directed to on-site storage or lawfully disposed of off-site.

Quality of contaminants released from the sewage treatment works

- (BC6) Treated effluent must comply, at the sampling and in-situ measurement point(s), with each of the release limits specified in *Schedule BC – Table 1 Treated Sewage Effluent Standards* for each quality characteristic.
- (BC7) The release of contaminants to land must be monitored at the frequency and at the sampling and in-situ measurement point specified in *Schedule BC-Table 1 Treated Sewage Effluent Standards* and records of the monitoring results kept for at least five years and made available to the administering authority on request.

Schedule BC—Table 1 treated sewage effluent standards

Quality characteristic	Sampling and in-situ measurement point location	Limit type	Release limit	Frequency
5-day Biochemical Oxygen Demand (inhibited)	E.g. Release pipe from sewage treatment plant	maximum	20 mg/L	Monthly
Suspended Solids		maximum	30 mg/L	
pH		range	6.0 to 9.0	
E-Coli		80 percentile	1000 cfu per 100 mL	
		maximum	10000 cfu per 100 ml	

Appendix 4 Fuel burning and/or combustion equipment conditions for hubs and/or places close to populated areas as well as other lower risk sites where such equipment is to be located

Fuel Burning or Combustion Equipment in Hubs and/or Places Close to Populated Areas

- (F1) Fuel burning or combustion equipment must only release contaminants to the atmosphere as provided for in Schedule F—Table 1.
- (F2) Contaminants must be directed vertically upwards.

Schedule F – Table 1 (release of contaminants)

Equipment	Minimum release height (m)	Minimum velocity(m/sec)	Contaminant released	Maximum release limit	Monitoring frequency
Gas compressors					
Diesel Compressors					
Power generator					

Note: this will vary depending on the use, fuel and type of equipment employed.

Fuel Burning or Combustion Equipment in Other Areas

- (F3) The calculated ground level concentration of contaminants discharged to the atmosphere under maximum operating conditions must not exceed the criteria in Schedule F Table 2 for each air contaminant.
- (F4) Prior to the installation of any new or additional fuel burning or combustion equipment following the issue of this environmental authority, the holder must ensure that proper and effective pollution control equipment is provided for in the design of the equipment to ensure that modelling performed in accordance with Condition F5 demonstrates compliance with the criteria specified in Schedule F Table 2
- (F5) The ground level concentrations resulting from all emissions from all fuel burning or combustion equipment expected to have a measurable impact on air quality within the study area must be calculated using an appropriate air dispersion model and the results must be made available to the administering authority on request.
- (F6) Contaminants must be directed vertically upwards.
- (F7) The holder of this environmental authority must maintain a Register of Fuel Burning or Combustion Equipment that must include, as a minimum, the following information for each item of equipment:
- (a) fuel burning or combustion equipment name and location;
 - (b) stack emission height (metres);
 - (c) minimum efflux velocity (metres /sec); and
 - (d) mass emission rates (g/s) / contaminant concentrations (mg/Nm³ @ x per cent O₂).
- (F8) The holder of this environmental authority must ensure that the information contained in the Register of Fuel Burning or Combustion Equipment is complete and current on any given day.
- (F9) All entries in the Register of Fuel Burning or Combustion Equipment must be certified by the chief executive officer or their delegate of the nominated principal holder for the tenure as being accurate and correct.
- (F10) The holder of this environmental authority must make the Register of Fuel Burning or Combustion Equipment or information contained in the Register available to the administering authority on request.

Schedule F—Table 2—Maximum Ground Level Concentration Criteria

Contaminant	Concentration	Units	Averaging time	Monitoring frequency
NOx as Nitrogen Dioxide	250	µg/m ³	1 hour	To be inserted
NOx as Nitrogen Dioxide	33	µg/m ³	1 year	To be inserted
Carbon monoxide	11	mg/m ³	8 hour	To be inserted

Appendix 5—Salt management

Brine Salt Reuse, Recycle or Off Site Disposal

- (GA1) Following cessation of petroleum activities, any residual brine or solid salt present in a CSG water dam must be removed and transported to a facility that can lawfully reuse, recycle or dispose of such waste.



Encapsulation of solid salt in a landfill

(GA2) Prior to encapsulation brine must be dried to a solid state.

(GA3) Solid salt may be disposed in a purpose built landfill monocell, designed and constructed by suitably qualified persons, and in accordance with the following:

- (a) the landfill is located on land under the freehold ownership of the holder of this environmental authority;
- (b) the landfill is not located within 100m of the boundary of the freehold land;
- (c) details of the landfill have been included on the contaminated land register;
- (d) only one landfill is permitted per petroleum project;
- (e) the facility should not occur above the natural surface level of the surrounding land;
- (f) the facility should be located such that there are no obvious below ground structures that are likely to bring water into contact with the exterior of the containment and have systems to prevent such contact;
- (g) the facility should not be flat and shallow, but compact to minimise the surface area of the containing structure;
- (h) the facility should be located with a sufficient buffer distance from the boundary of the relevant petroleum tenure/freehold tenure to minimise the risk of any adverse impact on sensitive environments, land with high ecological value, agricultural lands and useful surface water and groundwater; and
- (i) the facility should be designed and located so that it is protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level.

(GA4) The only regulated waste that is authorised to be disposed of in the landfill monocell is solid salt resulting from the treatment of CSG water produced during the conduct of the authorised petroleum activities

(GA5) The authorised landfill for disposal of solid salt waste is located at:

Petroleum Tenure xxxx Latitude xxx Longitude xxxxxx

(GA6) Material used in the construction of the solid salt disposal landfill monocell, above ground embankments, leachate collection dams and final cover must achieve the in situ, permeabilities for various landfill features complying with the corresponding limits specified in Schedule GA – Table 1.

(GA7) Any solid salt disposal landfill monocell, above ground embankments, leachate collection dams and final cover must be constructed, operated and maintained in accordance with the requirements specified in Schedule GA – Table 1.

Schedule GA—Table 1—Permeabilities and Special Requirements for Landfill Features

Landfill feature	Minimum permeability (m sec ⁻¹)	Minimum thickness (mm)	Special requirements
Base and walls of landfill cells and subcells	1 x 10 ⁻⁹	900	Constructed in at least 2 layers; and lined with a flexible membrane liner
Base and walls of seepage collection dam and leachate drains	1 x 10 ⁻⁹	900	Constructed in at least 2 layers; and lined with a flexible membrane liner
Interim landfill cover	Not relevant	500	Interim cover to be applied between salt waste placement events
Final landfill cover	1 x 10 ⁻⁸	700	Additional minimum cover of top soil of 150 mm

(GA8) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering any dams or other structures used for the storage or treatment of contaminants or wastes.

(GA9) The solid salt disposal landfill must be designed, installed and operated with an under liner leak detection and seepage management system that will allow the rapid detection of any passage of contaminants through the liner and also allow for the collection, monitoring and proper disposal of all such seepage.

Groundwater monitoring

(GA10) The solid salt disposal landfill must have a groundwater monitoring network installed and operated which:

- is installed and maintained by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater monitoring program design to be able to competently make recommendations about these matters; and
- includes a sufficient number of “bore(s) of compliance”, constructed in accordance with the “Minimum Construction Requirements for Water Bores in Australia” (Agricultural and Resource Management Council of Australia and New Zealand 1997), that are located not more than 150 metres from the landfill unit or the boundary of the landfill facility whichever is the closer, and provides the following:
 - i. allows the taking of representative groundwater samples from the uppermost aquifer and from the lower (confined) aquifer;
 - ii. allows the determination of background groundwater quality in hydraulically up-gradient or background bore(s) that have not been affected by any release of contaminants to groundwaters; and
 - iii. allows the determination of the quality of groundwater down gradient of any release of contaminants to groundwater including groundwater passing the relevant bore(s) of compliance.

(GA11) The holder of this environmental authority must conduct monitoring from the solid salt disposal landfill groundwater monitoring network and keep records of the determinations of the groundwater quality. All determinations of groundwater quality must be:

- (a) made in accordance with methods prescribed in the Water Quality Sampling Manual and, where appropriate, in accordance with standards ISO 5667-11 1993 or AS/NZ 5667.11: 1998 Water Quality – Sampling – Guidance on sampling at Groundwaters and ISO 5667-18: 2001 Water Quality Sampling – Part 18 – Guidance on Sampling of Groundwater at Contaminated Sites;
- (b) conducted for the water quality characteristics and at the frequency in Schedule GA - Table 2;
- (c) taken from sufficient monitoring points and/or wells to obtain representative samples of groundwater both up-gradient and down-gradient of the potential influence;
- (d) carried out with sufficient regularity and spatial and temporal replication to make statistically valid conclusions about the presence or absence of a release;
- (e) carried out with sufficient number of sampling events to determine ambient water quality and natural variability prior to any development of the site occurring;
- (f) followed by an assessment of whether or not there has been any statistically significant adverse change compared to background values at locations hydraulically down gradient of the landfill unit for each quality characteristic in Schedule GA - Table 2 Landfill Monitoring Requirements.



Schedule GA—Table 2—Landfill monitoring requirements

Quality characteristic	Frequency	
	during landfilling	Pre-landfilling baseline monitoring
pH	Monthly	Quarterly over a 12 month period prior to the commencement of any landfilling activity
Electrical Conductivity	Monthly	
CO ₃	Quarterly	
Cations (Na ⁺ , K ⁺ , Ca ²⁺ , Mg ²⁺)	Quarterly	
Anions (Cl ⁻ , HCO ₃ ⁻ , SO ₄ ²⁻)	Quarterly	
Dissolved Oxygen	Monthly	
Redox Parameters (Eh, ORP)	Monthly	
Heavy Metals (Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sn, Sb, Se, Ti, Zn)	Quarterly	
Organics (VOC, SVOC, TPH)	Quarterly	

(GA12) On any occasion that samples are obtained in accordance with condition (GA11) the holder of this environmental authority must measure and record standing groundwater levels in metres accurate to 0.01 metres. The elevation of the reference point, relative to Australian Height Datum, for use in any groundwater level measurement must be determined to an accuracy of 0.01 metres.

Appendix 6—CSG water, treated water or brine injection

Note: the conditions regarding injection of CSG water, treated water and brine are separated into two sections. The first section relates to trials (<12 months) designed to determine the feasibility of injection as a disposal option for CSG water, treated water or brine. Upon completion of the trial, the proponent may apply to the administering authority for an amendment to the environmental authority to use injection as a permanent disposal option. This amendment application must be supported by the results of the injection trial.

Conditions to be inserted by DERM when issuing EA approval.

Appendix 3

Gas transmission pipeline

Part 1—MCU conditions—Callide Infrastructure Corridor State Development Area and Gladstone State Development Area

MCU approval under the Development Scheme for the Gladstone State Development Area

Condition 1

East of the Callide Range, the proponent must locate the gas transmission pipeline within the Callide Infrastructure Corridor State Development Area (CICSDA) and Gladstone State Development Area (GSDA).

Condition 2

Final approved layout of the location of the gas transmission pipeline shall be subject to approval by way of material change of use under the Development Schemes for both the CICSDA and the GSDA.

Condition 3

As part of the material change of use approval process, the proponent shall provide an electronic copy of the gas transmission pipeline alignment within the CICSDA and the GSDA.

Condition 4

The proponent is also required to obtain an environmental authority approval from DERM prior to the commencement of construction.

Condition 5

The proponent must undertake petroleum activities in relation to the operation of the gas transmission pipelines in accordance with the Australian Pipeline Industry Association *Code of Environmental Practice – Onshore Pipelines*, October 2005 (the Code) or subsequent versions thereof.

Part 2—Coordinator-General imposed conditions—gas pipeline

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1

Prior to commencement of construction the proponent must submit to all relevant local governments a proposal and mitigating measures that satisfy local and regional requirements, in relation to workers' accommodation locations and impacts.



Condition 2

Workers' accommodation must be located to the satisfaction of the Department of Environment and Resource Management, having regard to potential noise emissions in accordance with *Draft State Planning Policy: Air, Noise and Hazardous Materials*.

Condition 3

The proponent must include provisions in the Environmental Management Plan for the gas pipeline, ensuring that, on land identified as being good quality agricultural land (GQAL), the pipeline contractor must:

- a) on completion of construction, remove temporary access tracks
- b) on completion of construction, lightly rip disturbed areas, replace topsoil and return the surface to a land use condition that serves the preconstruction use
- c) on completion of construction, implement land management and erosion control measures, and
- d) on land with GQAL class A, B or C1, bury the pipeline to at least 0.9m below finished land surface, or greater if deep ripping is a normal practice.

Condition 4

Prior to commencement of construction, the proponent must:

- a) consult with Queensland Rail and Powerlink on the design parameters for pipeline rail crossing under-boring and crossing of high voltage power line corridors, and
- b) implement the measures agreed by Queensland Rail and Powerlink to ensure safe and effective preservation of the integrity of rail infrastructure and the cathodic protection of each pipeline.

Condition 5

Prior to commencement of construction, the proponent must:

- a) consult with the Department of Transport and Main Roads, through the relevant regional offices, on the design parameters for pipeline crossing of state controlled roads and implement the measures decided
- b) consult with the relevant local government on the design parameters for pipeline crossing of local government controlled roads and implement the measures decided.

Condition 6

Prior to commencement of construction, the proponent must consult with the relevant Department of Environment and Resource Management's Senior Lands Officer (Stock Routes) and local government stock route officers through the relevant regional offices, in relation generally to the intended location of the gas transmission pipeline and associated infrastructure and the potential impacts on the stock route as well as specifically to the following:

- a) where there are to be permanent disruptions to the stock route network, the stock routes shall be realigned or replaced with a similar width and suitable country type to allow for the unimpeded movement of travelling stock
- b) where there are to be temporary disruptions to travelling stock (i.e. from the installation of buried infrastructure), suitable arrangements must be negotiated with the relevant local government prior to the commencement of works
- c) options for permanent or temporary diversions of stock may be considered provided that the routes are safe for travelling stock and drivers, and the travelling public
- d) adequate watering facilities and other travelling stock infrastructure must be provided where existing facilities become redundant due to the approved activities

- e) the parts of the stock route network disturbed or affected by the works must be rehabilitated upon completion of the project to a state that is safe for travelling stock and drovers, and the travelling public, and is consistent with the area's pre-disturbance state unless otherwise agreed by DERM and the local government.

Condition 7

Prior to commencement of construction, a species management plan for affected fauna, regardless of status (both terrestrial and marine) must be prepared in consultation with DERM for the total project including, development, operation and decommissioning phases. The plan must satisfy the requirements under section 322 of the *Nature Conservation (Wildlife Management) Regulation 2006* relating to tampering with animal breeding places. The plan shall be developed to:

- a) address the impacts to the species
- b) provide for the survival of the species in the wild.

Condition 8

Sewage treatment plants associated with temporary workers' accommodation must be located above Q50 flood levels.

Condition 9

Prior to commencement of works, the appropriate methods for disposal of waste must be determined by consultation with the relevant local governments and the Department of Environment and Resource Management.

Condition 10

The proponent must ensure that all potable water consumed on site, and at worker's accommodation complies with the *Australian Drinking Water Guideline 2004*.

Condition 11

Prior to commencement of works, the proponent must determine from all relevant local governments, any additional upgrades of sewerage or waste disposal facilities required as a result of this project's requirements for workers' accommodation and meet any costs associated with these upgrades.

Condition 12

All temporary workers' accommodation must be located, where practical, above the Q50 flood level.

Condition 13

A mosquito and biting midge management plan will be developed as part of the EM Plan and will include:

- a) assessment of work areas to be undertaken prior to works and on an informal basis to identify potential breeding sites;
- b) any required specific area control plans based on assessment of potential breeding sites will conform to DERM'S *Mosquito Management Code of Practice for Queensland*; and

Queensland Health and the relevant local councils will be contacted for assistance in choosing a suitable method

Condition 14

Prior to commencement of works, the proponent must prepare an Emergency Response Plan for temporary workers' accommodation, to the satisfaction of the Department of Community Safety, local Governments and Queensland Police.



Condition 15

All temporary workers' accommodation provided for the project must comply with the *Queensland Development Code Part MP 3.3 Temporary Accommodation Buildings and Structures* (1 July 2010 draft, until the code is finalised).

Condition 16

The proponent must provide bus transportation services for the movement of large numbers of construction and operational workforce, resident in workers' accommodation, to and from project construction sites.

Condition 17

The following requirements must apply to clearing of plants protected under the *Nature Conservation Act 1992*:

- a) clearing of plants must only occur in accordance with a clearing permit issued under the *Nature Conservation Act 1992*.
- b) for near threatened, rare, vulnerable and endangered species listed under the *Nature Conservation (Wildlife) Regulation 2006*, and species identified as critical and high priority under the DERM "Back on Track" species prioritisation methodology, a Significant Species Management Plan detailing specific measures for the mitigation or offsetting of all impacts must be provided to DERM for approval prior to construction in areas identified as habitat for these species.
- c) offsets must be provided for the permanent loss (take) of near threatened, rare, vulnerable and endangered plants in accordance with the *Queensland Government Environmental Offsets Policy 2008* and generally in accordance with the *Queensland Government Policy for Biodiversity Offsets (Consultation Draft)*.
- d) type A restricted least concern plants (Schedule 7 of the *Nature Conservation (Administration) Regulation 2006*) should be avoided as far as possible. This includes species in the Family: Cycadaceae, Orchidaceae, and Zamiaceae; and species in the genus: Brachychiton; Hydnohytium; Huperzia; Livistona; Myrmecodia; Platycerium; and Xanthorrhoea.
- e) clearing must be conducted in a sequential manner and in a way that directs escaping wildlife away from the activity and into adjacent natural areas.
- f) weather permitting, rehabilitation of areas containing least concern plants that are disturbed during clearing activities, where required by the clearing permit, must be commenced within three (3) months of completion of pipeline construction. Revegetation should be consistent with the plant density, floristic composition and distribution of the surrounding regional ecosystem types and within the province of the vegetation being cleared.
- g) for clearing impacts that result in permanent loss of least concern native plants (cannot be re-established within three (3) years of clearing or floristic modification), the permit holder must provide the DERM with a written detailed report of permanent vegetation loss, including the area, species affected and mapping of affected areas, within twelve (12) months of completion of the pipeline construction (Note: this is in addition to the required Return of operations).
- h) mitigation measures must include the allowance for regrowth of natural vegetation in the parts of the pipeline corridor not required for routine operation and maintenance in order to partially address fragmentation of habitat for small animals including birds, mammals, reptiles and amphibians.
- i) preconstruction surveys of the activities in gas fields and the final gas transmission pipeline corridor must identify koala habitat as defined under the *Nature Conservation (Koala) Conservation Plan 2006*. Specific mitigation measures and habitat offsets for residual impacts to koala habitat must be provided.
- j) an authorised person must be employed where there is a risk to native fauna present within the clearing site. An authorised person is a person permitted to tamper and interfere with a protected animal or a protected animal's breeding place. (For example, a licensed spotter-catcher is someone who is specifically licensed as a spotter-catcher through a Rehabilitation Permit issued by DERM.)

- k) the permit holder must ensure any animals injured by clearing activities under this permit are referred to an appropriate wildlife carer group or veterinarian (to be predetermined prior to clearing) and DERM must be notified within 24 hours of any injuries or deaths.
- l) rehabilitation of the gas fields and pipelines corridors must allow for the maximum re-establishment of native vegetation including the shrubby understorey and ground cover, providing habitat for small ground dwelling fauna species and restoration of landscape connectivity.

The Narrows

Condition 18

Construction of the pipeline across the Kangaroo Island wetlands and The Narrows shall be undertaken concurrently with construction of the pipelines of other LNG proponents as part of a bundled pipeline construction methodology.

Condition 19

The proponent shall undertake the following actions to negotiate for a bundled pipeline construction:

- a) the proponent shall negotiate in good faith with any proponent of a project which has been declared a significant project by the Coordinator-General and has a proposed gas transmission pipeline from the mainland to Curtis Island (LNG proponents) with a view to reaching agreement on a bundled pipeline crossing of the Kangaroo Island wetlands and The Narrows
- b) the period for the proponent and other LNG proponents to successfully negotiate an agreement for a bundled pipeline crossing shall expire on 1 September 2010
- c) in the event that an agreement is not reached within the set time or the proponent cannot accept the agreement reached among the other parties and the Coordinator-General is satisfied that the negotiation process has been conducted reasonably, then the proponent shall submit details of its position, including the information requested in Conditions 23 and 24 below, to the Coordinator-General for consideration and approval of an alternative pipeline crossing proposal. Any such proposal shall:
 - a. not compromise the pipeline crossing plans of other LNG proponents
 - b. result in aggregate environmental impacts in the wetlands and The Narrows area that are not significantly worse than impacts that would arise should all proponents participate in a bundled pipeline crossing. This might be achieved, for example, by using horizontal directional drilling or tunnelling.

Condition 20

The bundled pipeline route across the Kangaroo Island wetlands and The Narrows shall be contained within the corridor identified in drawing WR_QGC_00794 Rev.E that accompanied the report to DIP on 25 February 2010 titled, GLNG Pipeline FEED – Report of Mechanised Marine Crossing Installation Concept.

Condition 21

An assessment of the feasibility of co-locating water, sewage, and telecommunication services as part of the bundled gas pipelines crossing of the Kangaroo Islands wetlands and The Narrows shall be undertaken in consultation with:

- a) Gladstone and Area Water Board
- b) Gladstone Regional Council
- c) Telecommunication providers



Condition 22

Consultation be undertaken with relevant government departments and agencies that are required to give particular approvals in order for the bundled gas transmission pipeline crossing to proceed, in order to determine the requirements of those departments and agencies. Such departments and agencies include:

- a) DERM
- b) DEEDI
- c) Gladstone Ports Corporation
- d) Maritime Safety Queensland

Condition 23

Prior to lodging an application for an environmental authority (pipeline licence) for the gas transmission pipeline section across the Kangaroo Island wetlands and The Narrows, the following information shall be submitted to the Coordinator-General for review and approval:

- a) details of the agreement reached with other LNG proponents on the bundled pipeline crossing including:
 - i. the bundled pipeline route proposed
 - ii. LNG proponents participating in the bundled pipeline approach and the roles and responsibilities of each party
 - iii. the feasibility of co-locating services with the bundled gas pipeline, discussions with, and participation by, service providers
 - iv. the proposed bundled pipeline construction methodology
- b) details of discussions with government departments and agencies in Condition 22 and major issues unresolved
- c) an assessment of the environmental impacts of the construction and operation of the bundled pipeline and proposed mitigation strategies.
- d) a draft environmental management plan (EM Plan) as detailed in Condition 24.

The proponent shall pay a fee of 0.5 fee units to the Coordinator-General to offset the costs involved in undertaking the review.

Condition 24

The draft EM plan must contain, but not necessarily be limited to:

- a) an assessment of the environmental values and potential impacts to the environmental values of the Kangaroo Island wetlands and The Narrows, Port Curtis, Great Barrier Reef Coast Marine Park and the Great Barrier Reef World Heritage Area based on the site specific construction methodology detailing proposed mitigation measures. The EM plan must be prepared in accordance with section 310D of the *Environmental Protection Act 1994*, and the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
- b) the final pipeline route, design and construction methodology of the pipeline with specific detail on the crossing of Humpy and Targinie Creeks
- c) geotechnical information to demonstrate that the engineered solution is technically feasible
- d) acid sulfate soils data and analysis addressing the area within the proposed extension of the Gladstone State Development Area
- e) an acid sulfate soils management plan based on the final design and construction methodology of the bundled pipeline crossing
- f) surface water and groundwater hydrological assessment of the Kangaroo Island wetlands
- g) water quality assessment of the Kangaroo Island wetlands and The Narrows
- h) assessment of fish habitat, fish passage and marine plant values and impacts (temporary and permanent) within, and adjacent to, the corridor and strategies to avoid or minimise these
- i) assessment of impacts on navigation and strategies to avoid or minimise these

- j) cumulative impacts arising from dredging for The Narrows pipeline crossing and dredging for the Port of Gladstone Western Basin Dredging Project, and
- k) details of proposed environmental offsets consistent with the *Queensland Government Environmental Offset Policy 2008* and specific issue policies.

Condition 25

Environmental authorities under section 310M of the EP Act and pipeline licences under section 410 of the *Petroleum and Gas (Production and Safety) Act 2004* may be issued separately for the following sections of the gas transmission pipeline:

- a) gas-fields to the Kangaroo Island wetlands
- b) Kangaroo Island wetlands and the Narrows
- c) Curtis Island.

Condition 26

Monthly progress reports shall be submitted to the Coordinator-General from the date of this report on:

- a) updated project delivery timelines for the whole project and major project elements i.e. gas fields, pipeline and LNG facility
- b) progress against the timelines and relationship between construction of the pipeline across the wetlands and The Narrows and the overall project critical path
- c) progress in reaching agreement with other LNG proponents on the bundled construction approach for the Kangaroo Island wetlands and The Narrows
- d) proposed timeline for the bundled construction section
- e) progress in reaching agreement with service providers as required in Condition 21.

Part 3—Coordinator-General Imposed Environmental Conditions

Gas Pipeline

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for pipeline leases must provide:

- a) a construction schedule and methodology including plans and maps showing how the pipeline will be constructed through specific vegetation and soil types, topography and across riparian areas to avoid or minimise environmental harm
- b) details on how the proponent's pipeline will be constructed in common use infrastructure corridors in conjunction with other pipelines and services to minimise cumulative impacts, both on the mainland and Curtis Island
- c) details on waste management, treatment and disposal, including hydrostatic test water
- d) a maintenance and rehabilitation plan following construction to protect soil values and prevent weed invasion.



Condition 2

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for pipeline leases must:

- a) be prepared in accordance with the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*, where relevant
- b) specifically address:
 - i. the pipeline construction schedule and proposed methodology
 - ii. construction in common use infrastructure corridors
 - iii. the pipeline route on Curtis Island

A detailed illustrated and site specific construction methodology for Curtis Island must be provided, including information on necessary ancillary works and cumulative impacts arising from parallel construction of other gas pipelines, roadways, water pipelines and telecommunication cables to service multiple LNG facility sites.

Condition 3

Prior to the commencement of petroleum activities the proponent must provide to DERM for review the following aquatic values impacted by the Gas Transmission Pipeline, including:

- a) a detailed assessment of aquatic values (including animal breeding places) along the pipeline route must be provided. Site specific data must be included that accurately and comprehensively describes the environmental values and ecological condition at each aquatic site. The information must be used to determine the location of each watercourse or wetland crossing and site specific mitigation measures to protect the values identified.
- b) the information must also demonstrate that mitigation measures for permanent creek crossings are consistent with AS2885 – *Pipelines – Gas, Liquid and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice*. Those documents provide the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction of the pipeline, including:
 - i. minimisation of adverse impacts on fauna and significant habitat areas
 - ii. minimisation of impacts on riparian, aquatic and water dependent flora and fauna
 - iii. minimise erosion and sediment impacts
 - iv. maintain water quality and water flow requirements
 - v. maximise rehabilitation success of achieving long term site stability.
- c) Soils ground truthing, including identification of all sensitive soil and landform areas along the pipeline corridor including Good Quality Agricultural Land, cross referenced to known information on land units and land systems. Any variation between identified land values and DERM data sets must be identified and explained. An assessment of the potential impacts must be provided along with appropriate mitigation measures and construction methods applicable to the identified soil types or landforms.
- d) protection and restoration of good quality agricultural land that could qualify as strategic cropping land under the Government's draft discussion paper Protection of Strategic Cropping Land;
- e) Hydrostatic test water, including a detailed assessment of impacts from hydrostatic test water along the pipeline route, which must be provided. Source water quality data and characteristics of additives, particularly biocides) must be provided along with the proposed storage, treatment and disposal methods. The information must be used to determine the site specific mitigation measures including monitoring and reporting.

In addition, the design of all creek crossings and waterway barrier works must take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPlandF, July 2009), including:

- a) Protection of flora and fauna during construction and operation, including reduction or disruption to habitat. Particular mention must be made of any potential disruption to Koala or endangered species habitats.
- b) Scheduling of construction to protect the breeding and nesting seasons of the endangered Fitzroy and White Throated Snapping Turtles where applicable
- c) Unless otherwise agreed by DERM, horizontal directional drilling must be undertaken at all wetland crossings within the known distribution of *R. leukops* and *E. albagula* with a minimum buffer width exceeding the maximum recorded distance of nesting from the waterway.
- d) Rehabilitation of disturbed riparian areas including commitments to maximising the use of locally sourced species and intensive planting

Condition 4

The following requirements apply to clearing of plants protected under the *Nature Conservation Act 1992*:

- a) clearing of plants may only occur in accordance with a clearing permit issued under the *Nature Conservation Act 1992*.
- b) for near threatened, rare, vulnerable and endangered species listed under the Nature Conservation (Wildlife) Regulation 2006, and species identified as critical and high priority under the DERM "Back on Track" species prioritisation methodology, a Significant Species Management Plan detailing specific measures for the mitigation or offsetting of all impacts must be provided to DERM for approval prior to construction in areas identified for these species.
- c) offsets must be provided for the permanent loss (take) of near threatened, rare, vulnerable and endangered plants in accordance with the *Queensland Government Environmental Offsets Policy 2008*.
- d) a Significant Species Management Plan must be submitted to DERM for approval, prior to construction, setting out mitigation measures for Type A restricted least concern plants including:
 - i. Avoiding clearing individual species where possible (e.g., edge of Right Of Way)
 - ii. Salvaging and reuse for on-site revegetation where practicable
 - iii. Salvaging and reuse for local area revegetation where practicable
 - iv. Seed collection and use of seed for revegetation where practicable.
- e) clearing shall be conducted in a sequential manner and in a way that directs escaping wildlife away from the activity and into adjacent natural areas.
- f) rehabilitation of areas containing least concern plants that are disturbed during clearing activities, where required by the clearing permit, must be commenced within three (3) months of completion of pipeline construction. Revegetation must be consistent with the plant density, floristic composition and distribution of the surrounding regional ecosystem types and within the province of the vegetation being cleared.
- g) for clearing impacts that result in permanent loss of least concern native plants (cannot be re-established within three (3) years of clearing or floristic modification), the permit holder must provide the DERM with a written detailed report of permanent vegetation loss, including the area, species affected and mapping of affected areas, within twelve (12) months of completion of the pipeline construction (Note: this is in addition to the required Return of operations).



Condition 5

The following requirements apply to habitat protection under the *Native Conservation Act 1992*:

- a) Mitigation measures must include the allowance for regrowth of natural vegetation in the parts of the pipeline corridor not required for routine operation and maintenance in order to partially address fragmentation of habitat for small animals including birds, mammals, reptiles and amphibians.
- b) Preconstruction surveys of the activities in gas fields and the final gas transmission pipeline corridor must identify koala habitat as defined under the *Nature Conservation (Koala) Conservation Plan 2006*. Specific mitigation measures and habitat offsets for residual impacts to koala habitat must be provided.
- c) An authorised person must be employed where there is a risk to native fauna present within the clearing site. An authorised person is a person permitted to tamper and interfere with a protected animal or a protected animal's breeding place. (For example, a licensed spotter-catcher is someone who is specifically licensed as a spotter-catcher through a Rehabilitation Permit issued by DERM.)
- d) The permit holder must ensure any animals injured by clearing activities under this permit are referred to an appropriate wildlife carer group or veterinarian (to be predetermined prior to clearing) and DERM must be notified within 24 hours of any injuries or deaths.
- e) Rehabilitation of the gas fields and pipelines corridors must allow for the maximum re-establishment of native vegetation including the shrubby understorey and ground cover, providing habitat for small ground dwelling fauna species and restoration of landscape connectivity.

Condition 6 – Environmental Offsets

An Environment Offsets Program, consistent with the *Queensland Government Environmental Offset Policy 2008* and specific issue policies must be provided for approval to the Coordinator-General prior to environmental authorities being issued covering gas field development, pipeline construction and LNG facility construction and operation.

The program must detail:

- (a) the principles adopted for the environmental offsets strategy
- (b) the predicted total loss (extent and type) of areas of ecological value, (e.g. remnant vegetation, high value regrowth, wetlands, significant conservation species, habitat, biodiversity corridors) which, for the listed species and communities and essential habitats, shall be no greater than the areas specified for each item in the tables of section 6.5 of the Coordinator-General's report and corresponding tables in the Proponent's SEIS, with appropriate allowances for reductions due to co-location of species within habitats and ecosystems
- (c) the procedure to identify the requirements for environmental offsets for specific components of the project over the life of the project
- (d) relevance to any legislative requirements for offsets
- (e) the mechanism to secure and manage the environmental offset for long term protection of values
- (f) the location, size and values of the offsets
- (g) any management measures, including funding, required to maintain or enhance values for the life of the offset; and
- (h) a system for reporting to the Coordinator-General on offset arrangements, their management and how offset values are being maintained.

Part 4—Environmental Authority Conditions— gas pipeline

SCHEDULE A – GENERAL CONDITIONS

PREVENT AND/OR MINIMISE LIKELIHOOD OF ENVIRONMENTAL HARM

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent or minimise the likelihood of environmental harm being caused.

MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
- a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority
 - b) maintain such measures, plant and equipment in a proper and efficient condition
 - c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the environmental harm caused by the petroleum activities.
- (A6) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

COMPLIANCE WITH AUSTRALIAN PIPELINE INDUSTRY ASSOCIATION CODE OF ENVIRONMENTAL PRACTICE

- (A8) The holder of this authority must undertake petroleum activities in relation to the operation of petroleum pipelines in accordance with the Australian Pipeline Industry Association *Code of Environmental Practice – Onshore Pipelines*, October 2005 (the Code) or subsequent versions thereof. To the extent of any inconsistency between the conditions of this environmental authority and the Code, the conditions of this authority prevail.

FINANCIAL ASSURANCE

- (A9) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the construction, operation and decommissioning of the relevant petroleum pipeline at the time of the submission of the original or any amended work program or development plan. The calculation of financial assurance must be calculated in accordance with the guideline *Financial assurance for petroleum activities*.
- (A10) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

DEFINITIONS

- (A11) Words and phrases used in this authority are defined in Appendix 1 – Definitions. Where a definition for a term used in this authority is sought and the term is not defined within this authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.



ENVIRONMENTAL MANAGEMENT PLAN

- (A12) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities. Documentation relating to the EM plan must be kept.
- (A13) The EM plan required by condition (A12) must address, at least, the following:
1. Describe each of the following:
 - (a) each relevant resource authority for the environmental authority
 - (b) all relevant petroleum activities
 - (c) the land on which the activities are to be carried out
 - (d) the environmental values likely to be affected by the activities
 - (e) the potential adverse and beneficial impacts of the activities on the environmental values.
 2. State the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
 3. Include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application
 4. State a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program.
 5. Training staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - (a) The environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management
 - (b) Any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these
 - (c) Control procedures to be implemented for routine operations for day to day activities to minimise the likelihood of environmental harm, however occasioned or caused
 - (d) Contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation)
 - (e) Organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues
 - (f) Effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management
 - (g) Obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals
 - (h) Monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
 6. The conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually
 7. A program for continuous improvement.

SCHEDULE B—ENVIRONMENTAL NUISANCE

(B1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activity must not cause an environmental nuisance at any sensitive place or commercial place.

NOISE

(B2) Prior to undertaking petroleum activities that are likely to impact upon a sensitive or commercial place, the holder of this authority must investigate potential noise emissions from the proposed petroleum activities and determine if noise emissions are likely to exceed the limits set in Condition (B3).

(B3) If noise emissions are likely to exceed the limits specified in Schedule B, Table 1, then the holder must take appropriate measures to either relocate the petroleum activity or incorporate noise abatement and / attenuation measures to mitigate those impacts. These measures must be in place prior to undertaking the proposed petroleum activity.

(B4) Noise emitted from any aspect of the petroleum activities must not exceed the noise levels, specified in Schedule B, Table 1 at any sensitive or commercial place, other than those owned by the holder of this authority.

(B5) In the event of a complaint regarding noise from the petroleum activities at a sensitive or commercial place, the holder of this authority must conduct an appropriate investigation and must implement remedial action, if the noise from the petroleum activities exceeds the noise limits in Schedule B, Table 1 at the sensitive or commercial place.

(B6) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency’s Noise Measurement Manual or the most recent version of AS1055 Acoustics – Description and measurement of environmental noise and the EPA guideline, Assessment of low frequency noise and the EcoAccess guideline, Planning for noise control.

ALTERNATIVE ARRANGEMENTS AVAILABLE WHEN NOISE EMISSIONS MAY CAUSE NUISANCE FOR LIMITED PERIODS

(B7) Where the holder of this authority has, at their cost, made alternative arrangements to the satisfaction of and with the written agreement of each person affected by nuisance noise emissions at a sensitive or commercial place, then the requirements specified in Schedule B, Table 1- Noise Limits will not apply at that sensitive or commercial place for the period of the alternative arrangements.

(B8) As a minimum each written agreement of an alternative arrangement must state:

1. the location of the sensitive or commercial place
2. the names of the affected persons
3. the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation)
4. the period of the alternative arrangement(s).

SCHEDULE B, TABLE 1 – NOISE LIMITS

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L_{A90, adj, 15 mins}	lesser of bg+3	lesser of bg+0 or 40				



L_{A10}, adj, 15 mins	lesser of bg+5	lesser of bg+ or 45	bg+0	lesser of bg+ or 45	lesser of bg+ or 40	
L_{A1}, adj, 15 mins	lesser of bg+10	lesser of bg+10 or 50	lesser of bg+ or 45	lesser of bg+10 or 50	lesser of bg+10	lesser of bg+
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L_{A90}, adj, 15 mins	lesser of bg+5 or 50	bg+0	bg+0	lesser of bg+3 or 43	bg+0	bg+0
L_{A10}, adj, 15 mins	lesser of bg+10 or 55	lesser of bg+10 or 50	lesser of bg+5 or 45	lesser of bg+10 or 50	lesser of bg+10 or 45	lesser of bg+5 or 40
L_{A1}, adj, 15 mins	lesser of bg+15 or 60	lesser of bg+15 or 55	lesser of bg+10 or 50	lesser of bg+15 or 55	lesser of bg+15 or 50	lesser of bg+10 or 45

- bg = background noise level
- In the event that measured bg is less than 25 dB(A), then 25 dB(A) is to be substituted for the measured level
- If the background is higher than the number shown on the second line in any box, the limit is to be background plus 0.

BLASTING ACTIVITIES

- (B9) All blasting must be carried out in a proper manner by a competent person in accordance with best practice environmental management and Australian Standard 2187 to minimise the likelihood of any adverse effects being caused by airblast overpressure and/or ground borne vibrations at any sensitive or commercial place.
- (B10) Noise from blasting operations must not exceed an airblast overpressure level, when measured at or extrapolated to any noise sensitive or commercial place, of 115 dB (linear peak) for nine (9) out of any ten (10) consecutive blasts initiated nor 120 dB (linear peak) at any time.
- (B11) Ground-borne vibration peak particle velocity caused by blasting operations, when measured at or extrapolated to any noise sensitive or commercial place, must not exceed more than 5 mm per second for nine (9) out of any ten (10) consecutive blasts initiated, nor 10 mm per second at any time.

BLAST AND VIBRATION MONITORING

- (B12) Should complaints about blasting and/or vibration be received or when requested by the Administering Authority, monitoring and recording of air blast overpressure and ground borne vibration (as relevant to the complaint) must be undertaken to investigate any complaint of nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
1. maximum instantaneous charge;

2. location of the blast within the site (including any bench level);
3. airblast overpressure level (dB Linear Peak);
4. peak particle velocity (mms-1);
5. location, date and time of recording;
6. measurement instrumentation and procedure;
7. meteorological conditions for blast monitoring (including temperature, relative humidity, temperature gradient, cloud cover, wind speed and direction); and
8. distance/s from blast site to potentially noise-affected building/s or structure/s.

SCHEDULE C – WATER MANAGEMENT

RELEASE TO WATERS

- (C1) There must be no release of contaminants to waters.

RELEASE TO LAND

- (C2) The holder of this authority may allow pipeline trench water to be released to land for disposal provided that the water does not have any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm.
- (C3) Subject to Condition (C2), the holder of this authority must ensure that the release of trench water to land must be carried out in a manner that ensures that:
1. vegetation is not damaged
 2. soil erosion and soil structure damage is avoided
 3. the quality of groundwater is not adversely affected
 4. there are no releases of trench water to any surface waters.

MANAGEMENT OF HYDROSTATIC TEST WATER

- (C4) The holder of this authority must ensure that:
1. hydrostatic test water is not released to waters
 2. hydrostatic test water containing chemical additives is not released to land without written consent from the administering authority
 3. hydrostatic test water released to land does not exceed the water quality limits specified in Schedule C – Table 1.

SCHEDULE C, TABLE 1 – LIMITS FOR THE DISPOSAL OF HYDROSTATIC TEST WATER TO LAND

Parameter	Maximum value
pH	6.5-8.5 (Range)
Arsenic (mg/L)	2.0
Cadmium (mg/L)	0.05
Chromium (mg/L)	1
Copper (mg/L)	5
Iron (mg/L)	10
Lead (mg/L)	5



Manganese	10
Zinc (mg/L)	5
Nitrogen (mg/L)	35
Phosphorus (mg/L)	10
Electrical Conductivity (uS/cm)	2000

(C5) The release of hydrostatic test water authorised by Condition (C4 (3)) must be located at least 100m from the nearest watercourse and carried out in a manner that ensures that:

1. vegetation is not damaged
2. soil erosion and soil structure damage is avoided
3. the quality of groundwater is not adversely impacted
4. hydrotest water does not migrate outside the nominated land discharge areas.

DETERMINING WATER QUALITY CONTAMINANTS

(C6) All determinations of the quality of contaminants released must be made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management *Monitoring and Sampling Manual*, 2009, and carried out on samples that are representative of the discharge.

CONTAMINANT RELEASES TO GROUNDWATER

(C7) There must be no release of contaminants to groundwater.

SCHEDULE D – WASTE MANAGEMENT

(D1) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of contaminants to the environment from the storage, conditioning, treatment and disposal of regulated waste materials.

(D2) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of a hazardous contaminant to the environment.

(D3) Any spillage of hazardous waste or other contaminants that may cause environmental harm, must be effectively contained and cleaned up as quickly as practicable. Such spillage must not be cleaned up by hosing, or otherwise thereby releasing such waste or contaminants to any land or waters.

(D4) The holder of this authority must as soon as practicable remove and dispose of all regulated waste to a licensed waste disposal facility or recycling facility.

(D5) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility licensed to accept such waste.

(D6) When regulated waste is removed from within the boundary of the petroleum tenure and transported by the holder of this authority, a record must be kept of the following:

1. date of waste transport
2. quantity of waste removed and transported
3. type of waste removed and transported
4. route selected for transport of waste
5. quantity of waste delivered
6. any incidents (e.g. spillage) that may have occurred on route.

- (D7) If a person removes regulated waste associated with activities within the operational land and disposes of such waste in a manner which is not authorised or is improper or unlawful then, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.
- (D8) The holder of this authority must implement a Waste Management Plan consistent with the Environmental Protection (Waste) Policy 2000.
- (D9) The Waste Management Plan must address at least the following matters:
1. The types and amounts of waste generated;
 2. How the waste will be dealt with, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices mentioned in the waste management hierarchy (section 10 of the Environmental Protection (Waste Management) Policy 2000);
 3. Procedures for dealing with accidents, spills and other incidents that may impact on waste management; and
 4. How often the performance of the waste management practices will be assessed (i.e. at least annually); and
 5. The indicators or other criteria on which the performance of the waste management practices will be assessed.

SEWAGE TREATMENT AND DISPOSAL

In order to treat and dispose of sewage under this environmental authority an application for chapter 4A activity, section 632(b) of the *Environmental Protection Act 1994* sewage treatment must be included in the environmental authority application.

SCHEDULE E – LAND MANAGEMENT

MINIMISING DISTURBANCE TO LAND AND SOIL MANAGEMENT

- (E1) The holder of this authority must:
1. limit the right of way width to a maximum of 40 metres except as otherwise authorised by the administering authority in writing
 2. minimise disturbance to land in order to prevent land degradation
 3. ensure that for land that is to be significantly disturbed by petroleum activities (except in areas of highly erosive soils), the top layer of the soil profile is removed; and
 - (a) stockpiled in a manner that will preserve its biological and chemical properties, and
 - (b) used for rehabilitation purposes in accordance with condition (E30).
- (E2) The holder of this environmental authority must develop and implement soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:
4. establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients)
 5. a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter
 6. identify soil units within areas to be disturbed by petroleum activities at a scale of 1:100000, in accordance with the “Guidelines for Surveying Soil and Land Resources, 2nd Edition” (McKenzie et al. 2008), “Australian Soil and Land Survey Handbook, 3rd Edition” (National Committee on Soil and Terrain 2009) and “The Australian Soil Classification” (Isbell 2002)



7. develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - (a) shallow cracking clay soils
 - (b) deep cracking clay soils
 - (c) deep saline and/or sodic cracking clay soils with melonholes
 - (d) thin surface, sodic duplex soils
 - (e) medium to thick surface (say >15 cm), sodic duplex soils, and
 - (f) non-sodic duplex soils
8. detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity; and
9. for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

(E3) A copy of the soils management procedures must be made available to the administering authority upon request.

(E4) The holder of this authority must undertake an acid sulfate soils (ASS) investigation for the proposed linear disturbance (excavation, filling) on land areas that may potentially contain ASS (including all areas <5m AHD) according to the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998*.

(E5) The holder of this authority must provide detailed management measures in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* to the administering authority at least 20 business days prior to commencement of excavation or filling activities within areas identified as potential for containing ASS in the investigation outlined in condition (E4).

(E6) The holder of this authority must have due regard to any comments provided by the administering authority when implementing ASS management measures.

EROSION AND SEDIMENT CONTROL PLANS

(E7) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the Administering Authority.

(E8) Appropriate measures to achieve compliance with condition (E7) for the petroleum activity must be described in the EM plan and include:

1. diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater
2. collecting, treating, reusing or releasing contaminated stormwater runoff and incident rainfall in accordance with the conditions of this environmental authority
3. roofing or minimising the size of areas where contaminants or wastes are stored or handled
4. using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters
5. erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters
6. an inspection and maintenance program for the erosion and sediment control features, and
7. provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March

8. identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (E9) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater from disturbed areas.
- (E10) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (E11) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

DISTURBANCE TO LAND

- (E12) Prior to conducting petroleum activities that involve significant disturbance to land, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.
- (E13) The assessment required by Condition E12 must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA's) and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.
- (E14) The holder of this environmental authority, when carrying out petroleum activities must:
1. avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value
 2. minimise the risk of injury, harm, or entrapment to wildlife and stock
 3. minimise disturbance to land that may otherwise result in land degradation
 4. ensure that for land that is to be significantly disturbed by petroleum activities:
 5. the top layer of the soil profile is removed
 6. stockpiled in a manner that will preserve its biological and chemical properties, and
 7. used for rehabilitation purposes
 8. prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

- (E15) In accordance with Condition E14 above, if significant disturbance to land is unavoidable, the holder of this environmental authority must not clear vegetation or place fill:
1. reduce the width of the right of way to 30m and not place fill in areas where clearing of vegetation significantly isolates, fragments or dissects tracts of vegetation resulting in a reduction in the current level of ecosystem functioning, ecological connectivity (i.e. stepping stone or contiguous bioregional/local corridor networks) and/or results in an increase in threatening processes (e.g. potential impacts associated with edge effects or introduced species), or
 2. not clear vegetation or place fill in discharge areas.
- (E16) Clearing of remnant vegetation shall not exceed ten (10) metres in width for the purpose of establishing tracks and 20 metres in width for dual carriageway roads unless otherwise approved by the administering authority in writing.
- (E17) Cleared vegetation must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.



DISTURBANCE TO LAND – ENVIRONMENTALLY SENSITIVE AREAS

- (E18) Notwithstanding Conditions E12 to E17 inclusive, the holder of this environmental authority must ensure that the gas pipeline is not located in or within 200 metres of any listed category AESA.

DISTURBANCE TO LAND – ENDANGERED AND OF CONCERN REGIONAL ECOSYSTEMS

- (E19) Despite Condition E18, where it can be demonstrated that no reasonable or feasible alternative exists, petroleum activities may be undertaken within an endangered/of concern regional ecosystem and its associated buffer zone, subject to the following:
10. the petroleum activity is located and carried out in areas according to the following order of preference:
 - (a) pre-existing cleared areas or significantly disturbed areas less than 200m from an Endangered/Of Concern RE;
 - (b) undisturbed areas less than 200m from an Endangered/Of Concern RE;
 - (c) pre-existing areas of significant disturbance within an endangered/of concern regional ecosystem (e.g. areas where significant clearing or thinning has been undertaken within a regional ecosystem, and/or areas containing high densities of weed or pest species which has inhibited re-colonisation of native regrowth);
 - (d) areas where clearing of an endangered or of concern regional ecosystem is unavoidable;
 11. any vegetation clearing in an Endangered/Of Concern RE or associated buffer zone must not exceed any of the following areas:
 - (a) 10 per cent of the remnant unit of Endangered/Of Concern regional ecosystem as ground truthed and mapped before any activity commences as per condition D1 and D2 of this environmental authority for the life of the project; or
 - (b) six (6) metres in width for tracks and ten (10) in width on corners or
 - (c) thirty (30) metres in width for pipeline construction purposes.
- (E20) Details of any significant disturbance to land in or within 200m of Endangered or Of Concern regional ecosystems, along with a record of the assessment required by Conditions E2 and E3 must be kept and submitted to the administering authority upon request.
- (E21) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority
- ### **DISTURBANCE TO LAND – STATE FORESTS AND TIMBER RESERVE**
- (E22) Despite condition E18, activities may be undertaken within State Forests or Timber Reserves provided the holder of the environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.
- (E23) Where activities are to be undertaken in a State Forest or Timber Reserve that are also Endangered or Of Concern Regional Ecosystems, such activities may be undertaken in accordance with this environmental authority, provided the holder of this environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.
- (E24) The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse, wetland, or spring, including works that divert the course of flow of the water or works that impound the water.
- (E25) Despite condition E24, pipeline and road construction works may be undertaken in watercourses, wetlands or springs where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference:
- 1) conducting work in times of no flow;
 - 2) using all reasonable and practical measures to reduce impacts in times of flow; and

- 3) horizontal directional drilling will be used for the construction of the pipeline across the Dawson River, unless the construction occurs in times of no flow or an alternative construction methodology is agreed with the administering authority in writing.
- (E26) Activities or works resulting in significant disturbance to the bed or banks of a watercourse or wetland, or a spring must:
- a) only be undertaken where necessary for the construction and/or maintenance of roads, tracks and pipelines that are essential for carrying out the authorised petroleum activities and no reasonable alternative location is feasible;
 - b) be no greater than the minimum area necessary for the purpose of the significant disturbance;
 - c) be designed and undertaken by a suitably qualified and experienced person taking into account the matters listed in Section 5. Planning Activities and Section 6 Impact Management During Activities of DERM's "*Guideline – Activities in a watercourse, lake or spring associated with mining operations*" dated April 2008, or more recent editions as such become available
 - d) upon cessation of the activities or works, commence rehabilitation immediately such that the final rehabilitation is to a condition that will ensure the ongoing physical integrity and the natural ecosystem values of the site.
- (E27) Sediment control measures must be implemented to minimise any increase in water turbidity due to carrying out petroleum activities in the bed or banks of a watercourse or wetland, or a spring.
- (E28) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse, wetland or spring. If, due to the petroleum activities, water turbidity increases in the watercourse, wetland or spring outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (E29) Petroleum activities must not be carried out in River Improvement Trust Asset Areas without the approval of the relevant River Improvement Trust.

Note: Locations and details of River Improvement Trust Asset Areas can be obtained from the relevant River Improvement Trust. A list of the relevant River Improvement Trusts will be provided by DERM.

REHABILITATION REQUIREMENTS

- (E30) Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associated with the authorised petroleum activities on the relevant petroleum authority.
- (E31) For areas of native vegetation, revegetation must use seed sourced from local provenance native species.
- (E32) As soon as practicable and within 3 months at the end of petroleum activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the *National Environment Protection (Site Assessment) Measure 1999* where land has been subject to contamination caused by petroleum activities authorised under this authority.
- (E33) All land significantly disturbed by petroleum activities must be rehabilitated to:
- (a) a stable landform with a self-sustaining vegetation cover with same species and density of cover to that of the surrounding undisturbed areas, except over the area that must be maintained free of large flora species for pipeline integrity and access, and in cases where approval is sought in accordance with Condition (E30);
 - (b) ensure that all land is reinstated to the pre-disturbed land use and suitability class;
 - (c) ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities.



- (E34) Notwithstanding Condition (E33) any planned rehabilitation outcome that does not fulfil the rehabilitation requirements listed in Condition (E33) approval must be sought from the administering authority, prior to the rehabilitation being carried out.
- (E45) Maintenance of rehabilitated areas must take place to ensure and demonstrate:
- (a) stability of landforms;
 - (b) erosion control measures remain effective;
 - (c) stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters;
 - (d) plants show healthy growth and recruitment is occurring; and
 - (e) declared pest plants are controlled on rehabilitated areas to a level consistent with the surrounding property and prevented from spreading to unaffected areas through authorised petroleum activities.
- (E36) Rehabilitation can be considered successful when the site can be managed for its designated land-use (either similar to that of surrounding undisturbed areas or as otherwise agreed in a written document with the landowner/holder and administering authority) without any greater management input than for other land in the area being used for a similar purpose and there is evidence that the rehabilitation has been successful for at least 3 years.

PEST AND WEED MANAGEMENT

- (E37) The holder of this authority must develop and implement a pest and weed control program that includes but is not limited to the following:
- (a) identification of areas requiring pest and weed control;
 - (b) control measures to prevent the spread of pest and weed species; and
 - (c) measures to eliminate infestations of noxious pest and weed species that may occur.

STORAGE AND HANDLING OF CHEMICALS, FLAMMABLE AND COMBUSTIBLE LIQUIDS

- (E38) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the relevant Australian Standard.
- (E39) Flammable and combustible liquids (including petroleum products and associated piping and infrastructure), must be stored, handled and maintained in accordance with the latest edition of Australian Standard 1940 – *The Storage and Handling of Flammable and Combustible Liquids*.
- (E40) Any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- (a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110 per cent of a single storage tank or 100 per cent of the largest storage tank plus 10 per cent of the second largest storage tank in multiple storage areas; and
 - (b) drum storages must be bunded so that the capacity and construction of the bund is sufficient to contain at least 25 per cent of the maximum design storage volume within the bund.
- (E41) All containment systems must be designed to minimise rainfall collection within the system.

SCHEDULE F – FAUNA MANAGEMENT

- (F1) The holder of this authority must develop and implement fauna management procedures in such a manner that petroleum activities are undertaken to prevent and/or minimise environmental harm.
- (F2) The fauna management procedures must include but not be limited to:
- (a) training and awareness of staff and contractors

- (b) conduct of a preconstruction ecological survey to identify the presence of any endangered, vulnerable or rare fauna species and identify and mark hollow-bearing trees
 - (c) the development of management strategies to minimise impact on any endangered, vulnerable or rare species
 - (d) minimising the clearing of mature and hollow-bearing trees
 - (e) minimising the length of time the trench is open through the staging of activities
 - (f) temporary exclusion fencing where practicable to restrict fauna access to the trench
 - (g) the use of “night caps” over open pipe string ends to prevent the ingress of wildlife
 - (h) pipes being strung with adequate gaps or selective backfilling to allow for fauna movement across the line of the pipe
 - (i) a suitably qualified person for fauna handling must be present during clear and grade activities to relocate fauna or recover any injured fauna and must check the entire trench for captured fauna at least daily, preferably in the morning
 - (j) installation of ramps and trench plugs with a slope less than 50 per cent at least every 1000m to assist fauna to leave the trench
 - (k) installation of shelter material to provide wet weather protection and reduction of heat stress, such as by placing sawdust filled Hessian bags in pairs every 250m.
- (F3) A copy of the fauna management procedures must be made available to the administering authority on request

SCHEDULE G – DECLARED WILD RIVER AREAS

- (G1) If the petroleum authority is in or partly within a declared wild river area, or a moratorium is in place under the *Wild Rivers Act 2005*, the holder of this authority must ensure that petroleum activities within the (proposed) wild river area are conducted in accordance with the conditions in the wild river declaration for the area relevant to the petroleum activities.

SCHEDULE H – PROJECT INFRASTRUCTURE

- (H1) All petroleum infrastructure (including buildings, structures, plant and equipment erected and/or used for the petroleum activities) authorised under this environmental authority must be located within the PPL <insert number> License Area.
- (H2) All petroleum infrastructure must be removed from the relevant petroleum authority prior to surrender of this environmental authority, except where agreed in writing by the administering authority and the current landowner.
- (H3) Prior to the commencement of decommissioning or abandonment activities the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.
- (H4) The holder of this environmental authority must decommission the petroleum and gas pipeline to a situation where ongoing, or potential environmental harm is prevented or minimised. As a minimum, pipeline must be decommissioned such that:
- (a) it no longer contains hazardous contaminants
 - (b) it is left in stable condition
 - (c) all the above ground infrastructure is removed
 - (d) all areas disturbed by above ground infrastructure are rehabilitated in accordance with the requirements of this environmental authority.

SCHEDULE I—DAMS

- (I1) Conditions (I3) to (I10) apply to all dams installed as part of the petroleum activities, as defined in this environmental authority.
- (I2) Dams in the significant or high hazard category as defined in Appendix 4 are not permitted under this environmental authority.



GENERAL CONDITIONS

- (13) The holder of this authority must ensure that all dams on the operational land are designed and constructed by a suitably qualified engineer and maintained in accordance with generally accepted engineering standards and practices.
- (14) In operating or decommissioning any dam, the holder of this authority must not interfere with any groundwater or surface water resource or watercourse so as to cause environmental harm, except where that interference and consequent harm has been authorised in this authority.
- (15) The holder of this environmental authority must ensure that any activities conducted under this authority, or enabled by this authority, do not compromise the integrity of any dam, either on the operational land or adjacent to the operational land.
- (16) The holder of this environmental authority must take advice from suitably qualified and experienced persons and, based on that advice, monitor the condition of all dams located on the operational land, for early signs of loss of structural or hydraulic integrity.
- (17) In the event of any early signs of loss of structural or hydraulic integrity, the holder of this environmental authority must take action to prevent and/or to minimise any environmental harm, and report any findings and actions taken to the administering environmental authority.
- (18) The holder of the environmental authority must assess the hazard category of each dam using Table 1 of Appendix 3 - prior to construction of any new dam, and thereafter on an annual basis. The holder of the environmental authority must act on that monitoring and assessment in accordance with Condition (I9).
- (19) Where the hazard category for any dam has been assessed as significant or high, the holder of this environmental authority must:
 - (a) notify the administering authority in writing
 - (b) implement measures to manage the potential for environmental harm
 - (c) apply to the administering authority to amend this environmental authority to allow for the operation of a significant or high hazard dam.
- (I10) The holder of this environmental authority must not abandon any dam, but must decommission each dam to a situation where ongoing environmental harm will not occur, unless in accordance with condition (E41). Decommissioned dams must no longer be dams but become landforms on the operational land and must comply with any rehabilitation requirements of this authority. Dams that are not decommissioned will be left in a stable, uncontaminated form complying with all standards for dams of agricultural purposes in consultation with DERM and DEEDI.

SCHEDULE J—MONITORING PROGRAMS

- (J1) The holder of this environmental authority must:
 - (a) develop and implement a monitoring program that will demonstrate compliance with the conditions in this authority
 - (b) document the monitoring and inspections carried out under the program and any actions taken.
- (J2) The holder of this environmental authority must ensure that a suitably qualified, experienced and competent person(s) conduct all monitoring required by this environmental authority.
- (J3) The holder of this environmental authority must record, compile and keep for a minimum of five years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation must be kept until the relevant petroleum tenure is surrendered.
- (J4) An annual monitoring report must be prepared each year and submitted to the administering authority when requested. This report shall include but not be limited to:
 - (a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this environmental authority and, a comparison of

the previous twelve (12) months monitoring results to both this environmental authority limits and to relevant prior results

- (b) an evaluation/explanation of the data from any monitoring programs
- (c) a summary of any record of quantities of releases required to be kept under this authority; and
- (d) a summary of the record of equipment failures or events recorded for any site under this approval
- (e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

SCHEDULE K—COMMUNITY ISSUES

MANAGING COMPLAINTS

- (K1) When the administering authority advises the holder of a complaint alleging nuisance (e.g. caused by dust or noise), the holder must investigate the complaint and advise the administering authority of the action proposed or undertaken in relation to the complaint.
- (K2) If the administering authority is not satisfied with the proposed or completed action, the holder must undertake monitoring or other action requested by the administering authority.
- (K3) The holder of this environmental authority must maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident.
- (K4) The holder of this environmental authority must retain the record of complaints required by this condition for 5 years.

COMPLAINT RESPONSE

- (K5) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
 - (a) time, date, name and contact details of the complainant
 - (b) reasons for the complaint
 - (c) any investigations undertaken
 - (d) conclusions formed
 - (e) any actions taken.

SCHEDULE L – NOTIFICATION PROCEDURES

NOTIFICATION OF EMERGENCIES AND INCIDENTS

- (L1) The holder of this environmental authority must telephone the DERM's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants or any event where environmental harm has been caused or may be threatened not in accordance with the conditions of this environmental authority.
- (L2) Subject to condition (L1), the holder of this environmental authority is required to report in the case of uncontained spills (including hydrocarbon, associated water or a mixtures of both) of the following volumes or kind:
 - a) releases of any volume to water
 - b) releases of volume greater than 200L to land
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.



- (L3) The notification of emergencies or incidents as required by conditions number (L1 and L2) must include but not be limited to the following:
- a) the holder of the authority
 - b) the location of the emergency or incident
 - c) the number of the authority
 - d) the name and telephone number of the designated contact person
 - e) the time of the release
 - f) the time the holder of the authority became aware of the release
 - g) the suspected cause of the release
 - h) the environmental harm caused, threatened, or suspected to be caused by the release
 - i) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (L4) Not more than fourteen (14) days following the initial notification of an emergency or incident, written advice must be provided of the information supplied in accordance with condition number (L3) in addition to:
- a) proposed actions to prevent a recurrence of the emergency or incident; and
 - b) outcomes of actions taken at the time to prevent or minimise environmental harm.
- (L5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the emergency or incident, which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.
- (L6) A record of incidents must be maintained to include a record of all incidents occurring in the previous 5 years.

Appendix 4

LNG facility

Part 1—MCU Conditions—LNG Facility

MCU approval under the Development Scheme for the Gladstone State Development Area

Condition 1

Minimise the visual impact of the construction and operation of the LNG facility by:

- a) constructing the LNG facility within the site footprint as identified by Figure 2.2.3 of the SEIS, and such that other conditions are complied with
- b) applying a colour scheme of the LNG facility and buildings, other than the LNG storage tanks and any necessary corrosion protected structures and pipe insulation, from the palette of predominant colours found in the locality to minimise the visual intrusion of the structures
- c) ensuring site works will minimise tree clearing with stabilisation and rehabilitation works on disturbed areas to be fully implemented within twelve months of commencement of operation of Train 1 of the LNG facility
- d) minimise light spill and avoid direct views of lights outside the LNG facility boundary, while maintaining the integrity of the sites safety systems.

Condition 2

A mosquito and biting midge management plan will be developed and approved by Queensland Health as part of the EM Plan and will include:

- assessment of work areas to be undertaken prior to works and on an informal basis to identify potential breeding sites
- any required specific area control plans based on assessment of potential breeding sites will conform to DERM'S Mosquito Management Code of Practice for Queensland; and

Queensland Health and the relevant local councils must be contacted for assistance in choosing a suitable method

Condition 3

The proponent must ensure that all potable water consumed on site and at worker's accommodation complies with the *Australian Drinking Water Guideline 2004*.

Condition 4

Within one month of appointing and mobilising an LNG facility construction contractor and prior to construction commencing, the proponent must submit to the Coordinator-General for approval, a code of conduct for the construction workforce while on site and while travelling to and from their place of residence and the construction site.

Condition 5

The proponent and its construction contractors must not bring private motor vehicles or water craft onto the LNG facility site.



Workforce accommodation

CONSTRUCTION WORKFORCE (LNG facility)

Condition 6

Accommodation of the LNG facility's construction workers within the Curtis Island Industry Precinct on Curtis Island will be in the form of a temporary workers accommodation facility. The temporary workers accommodation facility is to be located on the LNG facility site and must not compromise the intent of the Curtis Island Industry Precinct (CIIP) land use designation and the Gladstone State Development Area (GSDA) Objectives.

Any application for a material change of use within the GSDA must demonstrate any proposed TWAF will not compromise the purpose of the Curtis Island Industry Precinct land use designation or the GSDA objectives.

Condition 7

Final layout position and size of the temporary workers' accommodation facility shall be subject to approval by way of material change of use under the development scheme for Gladstone State Development Area.

Advice:

Based on the information provided to date, **I find** that the temporary workers accommodation facility of 1,500 single person compartments is acceptable.

Consideration of an increase to the number of single compartments in the temporary workers accommodation facility above 1,500 can be considered by the Coordinator-General through a subsequent material change of use assessment process, where the material change of use application demonstrates;

- a) this increase will not sterilise or inhibit industrial development (including related infrastructure) within the CIIP or the GSDA.
- b) the need for the proposed facility based on its size
- c) that the associated impacts can be adequately addressed, and
- d) provides justification for the proposed timeframe for use of the land.

Condition 8

The temporary workers' accommodation facility must comply with the *Queensland Development Code Part MP 3.3 Temporary Accommodation Buildings and Structures* (In force 1 July 2010).

Condition 9

Unless otherwise approved in writing by the Coordinator General, the temporary workers accommodation facility (TWAF) must be decommissioned in accordance with one of the following schedules:-

- a. if construction work on Train 2 is not commenced or underway within three (3) months of the completion of Train 1 then decommissioning of the TWAF must occur within six (6) months the completion of Train 1, or
- b. if construction work on Train 2 is commenced or underway within three (3) months of the completion of Train 1 then decommissioning of the TWAF must occur within six (6) months the completion of Train 2.

Decommissioning of the TWAF shall be undertaken in accordance with a decommissioning plan approved by the Coordinator-General. The decommissioning plan shall be submitted to the Coordinator-General for approval at least six (6) months prior to the date that decommissioning is to commence.

OPERATIONAL WORKFORCE

Condition 10

Accommodation for the operational workforce for emergency or maintenance (temporary use only) shutdown purposes within the LNG facility site shall be constructed as permanent buildings.

Condition 11

The buildings to accommodate the operational workforce are to be located on the LNG facility site and must not compromise the intent of the CIIP land use designation and the GSDA Objectives.

Any application for a material change of use within the GSDA must demonstrate any proposed accommodation for the operational workforce are for temporary use during operation of the LNG plant and will not compromise the purpose of the CIIP land use designation, or the GSDA objectives.

Condition 12

Any accommodation for the operational workforce must not preclude or inhibit industrial development (including related infrastructure) within the CIIP of the GSDA.

Condition 13

The accommodation for the operational workforce shall not exceed 110 single compartments and be contained within the footprint of the approved temporary workers accommodation facility, or as directed by the MCU.

Condition 14

The operational workforce accommodation must be decommissioned as part of the LNG plant decommissioning.

RELATED IMPACTS

Condition 15

The temporary workers accommodation facility and operational workforce accommodation shall achieve the noise levels set out in Table 1.

Table 1: Noise design objectives for temporary workers accommodation

Time of day	Noise design objectives for indoors measured at the receptor in dB(A)		
	LAeq,adj,1hr	LA10,adj,1hr	LA1,adj,1hr
Daytime and evening	35	40	45
Night-time	35	40	45

ADVICE

1. The proponent will require relevant development approvals for any temporary workers accommodation facility or operational workforce accommodation proposed after the removal of the temporary workers accommodation facility contemplated by this Evaluation Report.
2. The buildings to accommodate the operational workforce shall comply with all relevant building legislation and codes.



Part 2—Coordinator-General imposed conditions

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

Condition 1

The proponent must prepare a preliminary hazard analysis that demonstrates, to the satisfaction of the Hazardous Industries and Chemicals Branch, Department of Justice and Attorney-General, that the proposed site layout of the LNG plant and its associated facilities is appropriate in terms of the consequences that may occur from credible major accident scenarios at the facility, and meets the criteria of Condition 2.

The analysis should include the calculation of overpressure contours at 7, 14, 21 and 35kPa; heat radiation contours at 4.7, 12.6, 23 and 35 kW/m²; half and lower flammability limit contours for flammable vapor; and toxic exposure contours at ERPG 3 and ERPG 2 levels with contours displayed on a map of the facility and its surroundings. Discussion should be provided that explains the safety adequacy for the following:

- a) that a major accident in any process unit or storage vessel is unlikely to cause significant injury at any point inside the onsite temporary workers accommodation facility; and
- b) that a major accident in any process unit or storage vessel is unlikely to cause significant injury at the boundary of the facility.

Condition 2

The following hazard and risk endpoint contours must be kept within the site landward boundaries:

- a) fatality risk contour of 1×10^{-6} per year
- b) injury risk contour of 50×10^{-6} per year
- c) half lower flammability limit for flammable vapour escape
- d) overpressure of 7kPa from explosion
- e) heat flux of 4.7 kW/m²
- f) any NFPA 59A criteria additional to the above.

Contours will be calculated according to the principles of AS/NZS ISO 31000, and NFPA 59A.

For conditions 1 and 2, land that houses any temporary or operational workers accommodation and associated service and recreation facilities and is 50m from any habitable building is considered to be outside of the site boundary.

These limits must also be satisfied in any safety study under the *Dangerous Goods Safety Management Act 2001*. If the Act requires more stringent criteria, then the criteria in the Act will apply.

Condition 3

The proponent must prepare Emergency Response Plans for both construction and operation of the entire project. The proponent must prepare a construction ERP prior to commencement of works, and an operational ERP prior to commissioning of the plant, to the satisfaction of the Department of Community Safety and Queensland Police to include but not be limited to:

- a) workplace health and safety
- b) operational hazards and risk events
- c) natural disasters
- d) potential terrorist threats and attacks
- e) inter-site response arrangements with adjacent land and water site owners and occupiers to ensure cooperation on safety alerts, emergency measures.

If such satisfaction cannot be obtained, then it is recommended that the Coordinator-General is available to be a mediator for this approval.

Condition 4

Prior to commencement of construction, the proponent must prepare waste management plans for the construction and operation of the LNG facility and include them in the respective Environmental Management Plans. The plans must:

- a) document the intended use of the Gladstone Regional Council waste facilities
- b) be submitted to DERM and the Gladstone Regional Council for review
- c) be amended where indicated by the reviews
- d) be implemented in construction and operation of the project.

Condition 5

The final Environmental Management Precinct Exclusion Management Plan approved by the Coordinator-General sets out the areas to be excluded from access by vehicle or foot by all proponent or its construction contractor workers. The proponent or its construction contractors shall incur a security fee to be set by the Coordinator-General upon consideration of the circumstances, of a minimum of \$2500 to a maximum of \$75,000, for each incidence of environmental damage occurring in or around Curtis Island as a result of illegal access to the Environmental Management Zone by employees or contractors of the proponent. The fee maximum will be indexed each calendar year as provided for in Schedule 1 of Clause 25A of the *SDPWO Act*

Condition 6

Prior to commencement of works, the proponent shall determine from the local government, if necessary, any additional upgrades of water supply, sewerage or waste disposal facilities required as a result of this project's requirements for temporary and operational workforce accommodation and meet any costs associated with these upgrades.

Condition 7

Where approval of plans based on reasonable information is required of State agencies, such approval or disapproval will be provided within one (1) month. If there is no response or decision from the agency within one (1) month, the proponent may refer the matter to the Coordinator-General for determination.

Condition 8

- a) Substantial commencement of gas field, pipeline and LNG facility construction must occur within 4 years of the date of this Coordinator-General report, otherwise this report will expire, but may be extended by the proponent in accordance with clause (b).
- b) If, prior to expiry of the standard 4 year period of currency of the Coordinator-General report, construction of Trains 1 and 2 has substantially commenced, and the proponent has decided to proceed with substantial commencement of Third Train construction within the following 2 year period, the proponent may apply to the Coordinator-General to extend the Coordinator-General report for the further 2 year period if satisfactory contemporary social and logistics planning documents are provided to the Coordinator-General.
- c) If a decision is made to construct the Third Train, but the Third Train is not substantially commenced within a 6 year period, the Coordinator-General Report lapses and a new declaration and environmental assessment will be required, whether or not the Coordinator-General has extended the currency of the Coordinator-General report.



Part 3—Coordinator-General imposed environmental conditions—LNG facility¹⁷²

In accordance with section 54A and 54B of the *State Development and Public Works Organisation Act 1971*, I **nominate** that the following conditions apply to the project

These conditions take effect from the date of this report.

INFORMATION REQUIRED IN THE FOLLOWING CONDITIONS IS TO BE PROVIDED FOR REVIEW OR APPROVAL BY THE COORDINATOR-GENERAL PRIOR TO THE ISSUE OF AN ENVIRONMENTAL AUTHORITY FOR THE LNG FACILITY

Condition 1 – Cumulative Impacts

The proponent must provide to the Coordinator-General for review a specific report on the cumulative impacts of the LNG Facility. The report must address cumulative impacts of the project and other LNG Facility development projects addressing impacts on environmental values for:

- impacts of noise on sensitive receptors arising from the development of multiple LNG facilities and associated accommodation and recreation facilities on Curtis Island, including demonstration of the ability to comply with the Noise EPP over the life of the project
- impacts to the Gladstone Air Shed from air emissions arising from multiple LNG facilities on Curtis Island, including demonstration of the ability to comply with the Air EPP over the life of the project
- impacts on flora and fauna arising from multiple LNG and other port development on Curtis Island
- the marine environment, impacts on marine biological values and water quality arising from port infrastructure and emissions to water from multiple LNG Plants and supporting infrastructure on Curtis Island.

Condition 2 - draft EM Plan

The proponent must include the following provisions in the draft EM Plan:

- a) prior to any application for environmental authority (petroleum activities), a draft environmental management plan (EM Plan) must be provided to the Coordinator-General for review.
- b) the EM Plan must be prepared in accordance with the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities* where appropriate to the LNG Facility.
- c) the EM plan must specifically address, but not be necessarily limited to:
 - identification of all environmentally relevant activities conducted in the petroleum tenure and other approvals required for this component of the project to proceed
 - a construction environmental management plan (CEMP). The CEMP must include the following information:
 - design plans showing the extent of the works proposed

¹⁷² LNG Facility in this appendix includes all ancillary and associated structures within the site boundary including workers' accommodation and associated recreational facilities.

- a construction schedule and methodology, including plans and maps showing discharge points and emission controls for all construction stages
- environmental monitoring and a sampling program which details baseline data collection and provides the basis for ongoing monitoring of specified parameters for the period of the works, including appropriate triggers for mitigation and cessation of works
- any potential impacts or effects of the proposed works upon the environment and the means by which adverse impacts will be avoided or mitigated
- details on the sewage treatment plant and desalination plant, including:
 - i. design and operational performance information for sewage treatment and desalination.
 - ii. design and operational performance information for any outfalls and diffusers for emissions to Port Curtis including detailed analysis of existing water quality, effluent contaminants, acute and chronic toxic effects of contaminants on fauna and flora and any long term ecological effects.
 - iii. a detailed assessment of impacts from the discharge of treated sewage and brine should be provided. Source water quality data and characteristics of additives should be provided and disposal methods to be used. The information should be used to determine the site specific mitigation measures including monitoring and reporting.
 - iv. eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
 - v. adequacy of modelling to predict dimensions and duration of mixing zone.
- details on other plant, equipment or activities that involve emissions to the environment, including:
 - vi. a description of the plant, equipment or activities; and
 - vii. design and operational performance information for plant, equipment or activities.
- engineering design drawings for operational works in the intertidal area for the materials off-load facility, jetties and wharves;
- detailed list of waste streams including their handling, treatment and disposal arrangements;
- the environmental protection commitments proposed for the activities (including all associated accommodation and recreation activities on the Island) to protect the environmental values under best practice environmental management;
- a rehabilitation program for land proposed to be disturbed during construction of all petroleum infrastructure (including associated accommodation and recreation activities) on Curtis Island;
- specific reference to the disposal of dredge spoil within the area, including provisions for the management and treatment of acid sulfate or potentially acid sulfate soils and the protection of terrestrial habitats from saline leachate and/or drainage;



- details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on the environment from the works.
- Identification and characterisation of all wastes and emissions produced by the facility and its associated support infrastructure including its source, handling, treatment, disposal or release to the environment.
- Sewage treatment plant and desalination plant information for the operational life of the LNG facility, including:
 - a proposal for treated sewage to be discharged to land which includes wet weather storage
 - design and operational performance information for sewage treatment and desalination
 - design and operational performance information for any outfalls and diffusers for emissions to Port Curtis including detailed analysis of existing water quality, effluent contaminants, acute and chronic toxic effects of contaminants on fauna and flora and any long term ecological effects.
 - A detailed assessment of impacts from the discharge of treated sewage and brine should be provided. Source water quality data and characteristics of additives should be provided along with the proposed operational performance of the plant and the treatment and disposal methods to be used. The information should be used to determine the site specific mitigation measures including monitoring and reporting.
 - Eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
 - Adequacy of modelling to predict dimensions and duration of mixing zone.

Condition 4 – Environmental offsets

This condition applies to the whole project.

An Environment Offsets Program, consistent with the *Queensland Government Environmental Offset Policy 2008* and specific issue policies must be provided to the Coordinator-General and approved by the Coordinator-General before the finalisation of environmental authorities covering gas field development, pipeline construction and LNG facility construction and operation.

The program must address, but not be limited to, impacts on vegetation and biodiversity arising from:

- a) construction and operation of the LNG facility and associated gas transmission pipeline
- b) construction of marine infrastructure
- c) other activities (e.g. workers' accommodation facilities, port works for the project, ancillary works).

The program must detail:

- a) the principles adopted for the environmental offsets strategy
- b) the predicted total loss (extent and type) of areas of ecological value, (e.g. remnant vegetation, high value regrowth, wetlands, significant conservation species, habitat, biodiversity corridors) which, for the listed species and communities and essential habitats, shall be no greater than the areas specified for each item in the tables of section 6.5 of the Coordinator-General's report and corresponding tables in the Proponent's SEIS, with appropriate allowances for reductions due to co-location of species within habitats and ecosystems
- c) the procedure to identify the requirements for environmental offsets for specific components of the project over the life of the project
- d) relevance to any legislative requirements for offsets

- e) the mechanism to secure and manage the environmental offset for long term protection of values
- f) the location, size and values of the offsets
- g) any management measures, including funding, required to maintain or enhance values for the life of the offset; and
- h) a system for reporting to the Coordinator-General on offset arrangements, their management and how offset values are being maintained.

Part 4—environmental authority conditions

The following conditions relate to proposed conditions to be attached to an Environmental Authority for activities in a Petroleum Facilities licence.

SCHEDULE A – GENERAL CONDITIONS

PREVENT AND/OR MINIMISE LIKELIHOOD OF ENVIRONMENTAL HARM

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent and / or minimise the likelihood of environmental harm being caused.

MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
 - a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority
 - b) maintain such measures, plant and equipment in a proper and efficient condition
 - c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A6) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the risk of environmental harm from the petroleum activities.
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

- (A8) The holder of this authority must conduct construction in accordance with the Construction Environmental Management Plan approved by the Coordinator-General in accordance with Condition 3 of Appendix 2, Part 1 of the Coordinator-General's Evaluation Report.

ENVIRONMENTAL MANAGEMENT PLAN

- (A9) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities. Documentation relating to the EM plan must be kept.
- (A10) The EM plan required by condition (A9) must address, at least, the following:
 1. Describe each of the following:
 - (a) each relevant resource authority for the environmental authority;



- (b) all relevant petroleum activities
 - (c) the land on which the activities including associated accommodation and recreational activities are to be carried out
 - (d) the environmental values likely to be affected by the activities including associated accommodation and recreational activities
 - (e) the potential adverse and beneficial impacts of the activities including associated accommodation and recreational activities on the environmental values.
 2. State the environmental protection commitments the applicant proposes for the activities, including associated accommodation and recreational activities, to protect or enhance the environmental values under best practice environmental management
 3. Include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application
 4. State a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program.
 5. Training staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - (a) The environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management
 - (b) Any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these
 - (c) Control procedures to be implemented for routine operations for day to day activities including associated accommodation and recreational activities, to minimise the likelihood of environmental harm, however occasioned or caused
 - (d) Contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation)
 - (e) Organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues
 - (f) Effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management
 - (g) Obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals
 - (h) Monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
 6. The conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually
 7. A program for continuous improvement.
- (A11) A Stormwater Management Plan must be prepared and implemented for the site prior to construction and operation. The Stormwater Management Plan must address at least the following:
- a) prevention of incident storm water and storm water run-off from contacting wastes or contaminants;
 - b) diversion of upstream run-off away from areas where it may be contaminated by bulk products being loaded or unloaded, wastes, contaminants or other materials; and
 - c) collection, treatment and disposal of all contaminated storm water run-off.
- (A12) A Waste Management Program (WMP) in accordance with Part 5 of the Environmental Protection (Waste Management) Policy 2000 must be developed, implemented within 3

(three) months from the date of this authority, and maintained for the authorised petroleum activities.

- (A13) The EM Plan must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this approval.
- (A14) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

THIRD PARTY AUDITING

- (A15) Compliance with the conditions of this authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this authority and accepted by the administering authority, within one year of the completion of commissioning of the LNG Facility, and every three years thereafter.
- (A16) Upon receipt of the final third party audit report, the holder of this authority must submit a copy to the administering authority.
- (A17) The third party auditor must certify the findings of the audit in the report.
- (A18) The financial cost of the third party audit is borne by the holder of this authority.
- (A19) The holder of this authority must, within a reasonable period of time agreed in writing with the administering authority, act upon any recommendations arising from the audit report and:
 - a) investigate any non-compliance issues identified; and
 - b) as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
- (A20) Subject to condition (A15), and not more than one (1) months following the submission of the audit report, the holder of this authority must provide written advice to the administering authority addressing the:
 - a) actions taken by the holder to ensure compliance with this authority; and
 - b) actions taken to prevent a recurrence of any non-compliance issues identified.

FINANCIAL ASSURANCE

- (A21) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the authorised petroleum activities.
- (A22) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

DEFINITIONS

- (A23) Words and phrases used in this authority are defined in Appendix 1 – Definitions. Where a definition for a term used in this authority is not defined within this authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.

[Note: for the sake of brevity, the appendix of definitions has not been provided in this EIS assessment report but will be provided in the environmental authority.]

SCHEDULE B—AIR EMISSIONS

NUISANCE

- (B1) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B2) The release of dust and/or particulate matter resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B3) Dust and particulate matter must not exceed any of the following levels when measured at any nuisance sensitive or commercial place:



- a) Dust deposition of 120 milligrams per square metre per day over a 30-days averaging period, when monitored in accordance with Australian Standard AS 3580.10.1 of 2003 (or more recent editions); OR
- b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre (with five one day exceedances allowed in any one year period); and over a 24 hour averaging time, at a dust sensitive place downwind of the licensed place, when monitored in accordance with:
 - i. Australian Standard AS 3580.9.6 of 2003 (or more recent editions) 'Ambient air - Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet -Gravimetric method'; or
 - ii. any alternative method of monitoring PM10 which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

Note: The above 5 days exceedances per year are based on the expected exceedances from the natural events such as bushfires and dust storm.

THE RELEASE OF CONTAMINANTS TO THE ATMOSPHERE

- (B4) The release of contaminants to the atmosphere from a point source must only occur from those release points identified in *Schedule B, Table 1 - Contaminant Release Points* and must be directed vertically upwards without any impedance or hindrance.
- (B5) Contaminants must be released to the atmosphere from a release point at a height and a flow rate not less than the corresponding height and velocity stated for that release point in *Schedule B, Table 1 - Contaminant Release Points*
- (B6) Contaminants must not be released to the atmosphere from a release point at a mass emission rate/concentration, as measured at a monitoring point, in excess of that stated in *Schedule B, Table 1 - Contaminant Release Points*.
- (B7) Contaminants must be monitored not less frequently than specified in *Schedule B, Table 2 - Contaminant Release Limits to Air*.
- (B8) Monitoring of any releases to the atmosphere required by a condition of this approval must be carried out in accordance with the following requirements:
 - 1) Monitoring provisions for the release points listed in *Schedule B, Table 1 - Contaminant Release Points* must comply with the Australian Standard AS 4323.1 - 1995 'Stationary source emissions, Method 1: Selection of sampling positions' (or more recent editions).
 - 2) The following tests must be performed for each determination specified in *Schedule B, Table 2 - Contaminant Release Limits to Air*:
 - i) gas velocity and volume flow rate
 - ii) temperature
 - iii) water vapour concentration (moisture content).
 - 3) Samples must be taken when emissions are expected to be at maximum rates.
 - 4) During the sampling period the following additional information must be gathered:
 - i) production rate at the time of sampling
 - ii) raw materials and fuel used
 - iii) number of plant or equipment and operating units operating;
 - iv) reference to the actual test methods and accuracy of the methods.
- (B9) All release points referred to in *Schedule B, Table 1 - Contaminant Release Points* must be conspicuously marked with the corresponding release point number.

SCHEDULE B, TABLE 1 – CONTAMINANT RELEASE POINTS

Number of stacks/units	Source description	Minimum release height (m)	Minimum velocity *(m/s)
<i>This table can be completed once the Coordinator-General's conditions are satisfied.</i>			

*This limit applies during normal operating conditions.

SCHEDULE B, TABLE 2 – CONTAMINANT RELEASE LIMITS TO AIR

Monitoring location	Contaminant	Emission limits per stack*	Frequency of monitoring
<i>This table can be completed once the Coordinator-General's conditions are satisfied.</i>			

*These limits are applicable during normal operating conditions.

- (B10) Within 3 months of commissioning the facility, the holder of this environmental authority must conduct air emission monitoring to demonstrate compliance with air emission limits listed in Schedule B, Table 2 - *Contaminant Release Limits to Air* and submit report to the administering authority.

Flare conditions

- (B11) The flare must be equipped with a flare tip design to provide good mixing with air, flame stability and achieve a minimum Volatile Organic Compound (VOC) removal efficiency of 98 per cent under varied gas flow rate and meteorological conditions and meet the best practice design standards (e.g. NSW EPA: Protection of the Environmental Operations (Clean Air) Amendment (Industrial and Commercial Activities) Regulation 2005, or the US EPA Code of Federal Regulations: 40 CFR 60.18 and 40 CFR 63.11).
- (B12) The flare must be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification to appropriate personnel when the ignition system ceases to function.
- (B13) The flare must be designed to handle large fluctuations in both the volume and the chemical content of gases.
- (B14) Visible smoke and particulate emissions must not be permitted for more than five minutes in any two hour period during normal operating conditions.
- (B15) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

Fugitive Emissions

- (B16) The holder of this environmental authority must ensure that all reasonable and practicable measures are taken in the design and operation of the plant to minimise fugitive VOC emissions. Reasonable and practicable measures include but are not limited to:
- (a) implementation of a monitoring program to regularly leak test all units/components including pumps, piping and controls, vessels and tanks; and
 - (b) operating, maintenance and management practices to be implemented to mitigate fugitive VOC sources.



- (B17) The ducting and extraction systems that transfer effluent gases from one location to another must be constructed, operated and maintained so as to minimise any leakage of VOCs and vapours to the atmosphere occurring from these sources.
- (B18) In the event of emissions of contaminants occurring from industrial plant or ducting systems that transfer effluent gases from one location to another, the fault or omission that resulted in that emission must be corrected as soon as practicable.

Fuel Burning

- (B19) This authority only permits the burning of natural gas, methane gas or diesel fuel in the fuel burning equipment under normal operating conditions at the rate of the design capacity of the equipment.
- (B20) The sulphur content of fuel burned in the power generators must not exceed 0.5 percent by weight

Greenhouse Gas Emissions

- (B21) The holder of this authority must develop and implement a greenhouse gas reduction strategy for the LNG Facility. The strategy must include, but not limited to, the company’s policy on greenhouse gas emissions, an energy efficiency program, a continuous improvement program, better control systems and a CO₂ recovery plan.

SCHEDULE C – WATER MANAGEMENT

RELEASE TO WATERS

PERMITTED CONTAMINANT RELEASE AND DISCHARGE POINT(S)

- (C1) The only contaminant(s) permitted to be released directly or indirectly to any waters from the petroleum activities authorised on the petroleum facilities licence are the following releases to Port Curtis:
 1. Reverse Osmosis Concentrate (ROC) via the diffuser discharge point DF1 to Port Curtis, refer plan XXXX; and
 2. Treated sewage effluent via the diffuser discharge point DF1 to Port Curtis during the construction of train 1 and train 2, refer plan XXXX; and
 3. Treated sewage effluent via the diffuser discharge point DF1 to Port Curtis during the any period where soil cannot be irrigated and wet weather storage is at maximum capacity during operations, refer plan XXXX
 4. Uncontaminated stormwater from the LNG Facility site via the Stormwater Discharge Point SW1 to Port Curtis, refer plan XXXX.
- (C2) The release of contaminants directly or indirectly to waters:
 1. must not produce any visible discolouration of receiving waters; nor
 2. must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

SCHEDULE C, TABLE 1 – QUALITY CHARACTERISTIC LIMITS (TREATED SEWAGE EFFLUENT)

Monitoring point	Quality characteristics	Release limit	Limit type	Minimum monitoring frequency
S1 ¹	5-day Biochemical Oxygen Demand	<5 mg/L	80 percentile compliance	Weekly (composite sample ²)

	5-day Biochemical Oxygen Demand	35 mg/L	maximum	Weekly (composite sample ²)
	Suspended Solids	<5 mg/L	80 percentile compliance	Weekly (composite sample ²)
	Suspended Solids	50 mg/L	maximum	Weekly (composite sample ²)
	pH	6.5 to 8.5 pH units	range	Online continuous
	Faecal Coliforms, based on a minimum of 5 samples collected at not less than weekly intervals.	1000 colonies per 100mL sample	median	Weekly (composite sample ²)
	Total -N	3 mg/L	50 percentile compliance	Weekly (composite sample ²)
	Total - N	10 mg/L	maximum	Weekly (composite sample ²)
	Total -P	0.1 mg/L	50 percentile compliance	Weekly (composite sample ²)
	Total - P	1 mg/L	maximum	Weekly (composite sample ²)
	Ammonia -N	1 mg/L	50 percentile compliance	Weekly (composite sample ²)
	Ammonia - N	3 mg/L	maximum	Weekly (composite sample ²)
	Dissolved Oxygen	4 mg/L	minimum	Online continuous
<p>¹ Monitoring point S1 described as the Discharge Monitoring Point (NXX EXX), refer plan XXXX attached to this environmental authority.</p> <p>² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.</p>				

QUALITY CHARACTERISTICS OF RELEASE TO WATERS (TREATED SEWAGE EFFLUENT)

(C3) The release of contaminants from the sewage treatment plant to waters must comply, at the sampling and in situ monitoring point(s) specified in Schedule C, Table 1 - Quality Characteristic Limits (Treated Sewage Effluent), with each of the limits specified in Schedule C Table 1 - Quality Characteristic Limits (Treated Sewage Effluent) for each quality characteristic.



(C4) **Monitoring**

Monitoring of treated sewage effluent contaminants released to Port Curtis must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Table 1.

(C5) **Reverse Osmosis Concentrate (ROC)**

The total quantity of ROC released to waters on any one day must not exceed XX megalitres.

(C6) The ROC released via the diffuser discharge point DF1 must not exceed the release limits specified in Table 2 when measured at the monitoring point S2 described as the Discharge Monitoring Point (NXX EXX), refer plan XX attached to this approval.

SCHEDULE C, TABLE 2 – QUALITY CHARACTERISTIC LIMITS (REVERSE OSMOSIS CONCENTRATE (ROC))

Monitoring point	Quality characteristics	Release limit	Limit type	Minimum monitoring frequency
S2	Total Chlorine (as Cl)	0.5 mg/L	Long term 50th percentile	Daily (grab sample/ single measurement)
		1 mg/L	Maximum	
	Dissolved Oxygen	4.0 mg/L	Minimum	
	Chemical Oxygen Demand	No Limit	No Limit	Weekly (composite sample ²)
	5-day Biochemical Oxygen Demand (inhibited)		Maximum	
	Turbidity		Long term 50th percentile	Daily (single measurement)
			Maximum	
	EC	<i>This table can be completed once the Coordinator-General's conditions are satisfied.</i>		
	TDS			
	pH	6.5 to 8.5	Range	

¹ Monitoring point S2 described as the Discharge Monitoring Point (NXX EXX), refer plan XXXX attached to this environmental authority.

² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.

Schedule C, Table 3 Reverse Osmosis Concentrate release trigger limits (Toxicants)

Release point	Monitoring point	Quality characteristics	Trigger limit (dissolved fraction µg/l)	Trigger type	Minimum monitoring frequency
DF1 – Diffuser Discharge Point	S2	The ANZECC 95 th protection levels for toxicant should be added here		Maximum	Weekly
<p>¹ Monitoring point S2 described as the Discharge Monitoring Point (NXX EXX), refer plan XXXX attached to this environmental authority.</p> <p>² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.</p>					

(C7) Monitoring

Monitoring of contaminants released to Port Curtis must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Table 2 and Table 3.

(C8) Toxic Substances (Acute and Chronic)

Notwithstanding any other condition of this environmental authority, there must be no discharge of any contaminants to any waters where the no observed effect concentration (NOEC) for acute toxicity tests to any test organisms in a direct toxicity assessment (DTA) is observed at a 100 per cent concentration i.e. the lowest observed effect concentration (LOEC) must only be observed at a dilution greater than 1:1.

(C9): There must be no discharge of any contaminants to any waters where the NOEC for chronic toxicity tests to any test organisms in DTA is observed at a 6.25 per cent concentration i.e. the LOEC must only be observed at a dilution greater than 1:15.

(C10): Diffuser validation

Provide to the administering authority a monitoring plan for the diffuser modelling validation within 40 business days from the issue of this environmental authority. The monitoring plan must have the following objectives:

1. To validate all modelling and investigations related to the diffuser; and
2. To confirm that expected dilutions predicted in design of the diffuser under specified flow conditions are met as a minimum.

(C11): The Monitoring Plan (Diffuser Validation), required by condition (C10), must include (but not be limited to) the following:

1. A description of the diffuser as installed
2. A list of the environmental values to be protected within and adjacent to the diffuser
3. Sampling of reference sites to determine the background concentration of relevant water quality parameters
4. Sampling of the water column in the plume to determine and confirm the extent of the acute and chronic toxicity zone
5. Investigate employing other approaches (e.g. dye-based diffuser validation techniques) where electrical conductivity-based methods are inconclusive
6. Sufficient samples must be collected to determine the temporal and spatial extent of the toxicity zones within the plume
7. The methods for the collection and analysis of samples (including the Quality Assurance and Quality Control protocols adopted)
8. The methods of analysing the data and responding to the results



9. Monitoring must be done by a competent person(s) in accordance with methods prescribed in the latest edition of the *Department of Environment and Resource Management Water Quality Sampling Manual*; and carried out on representative samples.

(C12): The holder of the environmental authority must have due regard to comments, provided by the administering authority, in the finalisation of the Monitoring Plan (Diffuser Validation).

(C13): The holder of the environmental authority must provide to the administering authority a Diffuser Validation Report, not more than 20 business days after receipt of the results obtained from the Monitoring Plan (Diffuser Validation). The report must include:

1. The outcome of the monitoring including the methodology, findings and recommendations of the Monitoring Plan (Diffuser Validation)
2. A determination on the validation of modelling and investigations undertaken
3. Any resulting recommendations for changes necessary to minimise the likelihood of environmental harm and size of the toxicity zones.

(C14): **Routine Direct Toxicity Assessment**

The holder of the environmental authority must routinely undertake a DTA to quantify the toxicity of the ROC effluent combined with Treated Sewage Effluent. The Routine DTA must be undertaken in accordance with the following minimum requirements:

1. During the first 12 months following the commencement of discharge of ROC to the Port Curtis, a DTA must be carried out on a quarterly basis (with approximately 3 months between each Routine DTA).
2. After the first 12 months of operation and subject to four consecutive quarterly DTA results showing compliance with the release limits, the minimum frequency of Routine DTA shall be annual, except as provided by sub-clause (3) of this condition.
3. If a DTA result shows non-compliance with conditions Water 13 and or Water 14 of this development approval, then monitoring must recommence on a quarterly basis as in subclause 1 unless the registered operator can demonstrate with data and information, to the administering authority, that the cause of the non-complaint DTA result has been rectified and it is unlikely to recur.

(C15): **Event-based Direct Toxicity Assessment**

The holder of the environmental authority must undertake an Event-based DTA where one or more of the same trigger limits specified in Schedule C, Table 3 - *Reverse Osmosis Concentrate release trigger limits (Toxicants)* are exceeded on four consecutive occasions (weekly sampling) when measured at the monitoring point S1 described as the Discharge Monitoring Point (EXX NXX), refer plan XX attached to this environmental authority.

When any third consecutive exceedance of any same trigger limit is detected, the registered operator must make arrangements for priority analysis and reporting of the results of the subsequent sample and also make preparations with the DTA testing laboratories such that, should a fourth consecutive exceedance of the same toxicant occur, a DTA can be promptly undertaken. The DTA must occur forthwith following the fourth consecutive exceedance.

(C16): **Influent Quality and Treatment Train Critical Assessment**

The holder of the environmental authority must undertake an Influent Quality and Treatment Train Critical Assessment to determine the potential toxicity of the ROC when any factor in the treatment process or influent water quality change may result in an increased toxicological effect to aquatic organisms in the receiving environment. [An example would be use of a new water treatment chemical which has product information or chemical formulation showing a toxicological effect to aquatic organisms].

(C17): Where the Influent Quality and Treatment Train Critical Assessment determines that an increased toxicological effect may occur, a DTA must be undertaken utilising indicator organism(s) appropriate to the change and the results reported to the administering authority. [An example would be a change is planned in treatment processes and material toxicity to Crustaceans is indicated by reference material. A DTA using a Crustacean(s) or related indicator organism(s) must be carried out].

- (C18) The DTA procedure followed must address the following:
1. All specific methods and protocols to determine whether concentrations of toxicants are neither acutely toxic outside the approved acute toxicity zone nor chronically toxic outside the approved chronic toxicity zone to the test biota, including:
 - (a) Specific test organisms to be utilised for DTA testing, in accordance with Section 8.3.6.8 of the ANZECC 2000 Guidelines, to provide an accurate indication of actual and chronic toxic effects in the receiving waters, taking into consideration locally occurring species and the nature of any change being investigated; and
 - (b) The selection and characterisation of environmental waters for dilution of the ROC
 - (c) Characterisation of the ROC waste stream, including potential toxicants present
 - (d) The nature of the contaminant(s)
 - (e) Acute and chronic DTA testing conducted on end-of-pipe ROC discharged
 - (f) Test/biological end points
 - (g) DTA end-points (including NOEC and LOEC)
 - (h) Quality assurance/quality control
 - (i) Applicable Toxicity Identification Evaluation (TIE) procedures to be followed should the administering authority require such an evaluation
 - (j) Reporting of DTA procedure results promptly to the administering authority, which must include but not be limited to:
 - (i) NOEC for all bioassay results
 - (ii) LOEC for all bioassay results
 - (iii) All relevant sample collection information for the ROC test sample and receiving environment dilution water
 - (iv) Timing of ROC test sample collection in relation to process performance
 - (v) Details of any manipulation of the ROC test sample or receiving environment dilution water
 - (vi) ROC Test sample and receiving environment dilution water delivery details
 - (vii) Results of the chemical analysis of the ROC test sample for known toxicants of concern (i.e. all parameters on Tables 1 and 2 are a minimum requirement in addition to parameters indicative of any change), receiving environment dilution water, and the test water (ROC/receiving water) for each of the dilutions
 - (viii) Time between test sample collection and commencement of the DTA
 - (ix) Interpretation of results.
 2. Reporting of the progress and/or results of DTA testing to the administering authority no more than 20 business days following the initial results of the toxicity assessment.
- (C19) A written DTA procedure that effectively measures toxicity of the effluent must be developed by the registered operator to which this development approval relates, and be submitted to the administering authority within 20 business days of issue of this development approval.
- (C20) The holder of the environmental authority must have due regard to the administering authority's comments in the finalisation and any review of the DTA procedure.
- (C21) The finalised DTA procedure must not be changed without the prior written consent from the administering authority.
- (C22) The DTA must be designed and performed by a suitably qualified person.



(C23) **Minimum Responses to any Non Compliant Toxicity in Effluent**

Where a DTA has demonstrated observable toxicological effects for related tests at or greater dilutions than defined in the approved acute and chronic toxicity limits, the registered operator of the activity to which this development approval relates must:

1. Immediately advise the administering authority
2. Promptly investigate the toxicity result by:
 - (a) Identifying any trend or excessive presence in any contaminant likely to cause the observed toxicity; and
 - (b) Undertake an additional DTA or an appropriate single-species Toxicity Bioassay (following consultation with and as agreed with the administering authority) to investigate whether the non-compliant toxicity is still present; and
3. If following results of the investigations in either subclause 1(a) or 1(b) likely compliance with the toxicity release limits is not demonstrated, immediately advise the administering authority of the results and within 5 business days prepare and submit to the administering authority a Toxicity Management Plan (TMP) that has the following objectives:
 - (a) Identify the causative agent(s) responsible for the observed increase in toxicity; and
 - (b) Assess the risk posed to the environment by the non-compliant toxicity; and
 - (c) Reduce toxicity to the approved acute and/or chronic toxicity limits specified by this development approval forthwith.

- (C24) The TMP must, at a minimum, present the tasks and timeframes for corrective actions directed at identifying and eliminating the observed toxicological effect(s) out side of the approved toxicity zones.

Note: A Toxicological Identification Evaluation (TIE) maybe required as part of this TMP to determine the toxicant(s) responsible for the observed toxicological effect(s).

- (C25) A Confirmation DTA must be undertaken as soon as practicable after completion of the corrective action(s) required by the TMP/condition Water 25 to verify that the actions taken have been effective in eliminating the observed toxicological effects out side of the approved toxicity limits.

Note: This is an additional assessment other than normally required by the conditions of this development approval.

MONITORING OF VOLUME OF SEAWATER DESALINATION PLANT SEAWATER INFLUENT, DESALINATION EFFLUENT AND BRINE

- (C26) The daily volume and daily average flow rate of seawater influent treated must be determined or estimated by an appropriate method with an accuracy of +/- 5 per cent, and records kept of such determinations.
- (C27) The daily volume and daily average flow rate of desalination effluent released from the premises must be determined or estimated by an appropriate method with an accuracy of +/- 5 per cent, and records kept of such determinations.
- (C28) The daily volume and daily average flow rate in m³/s of the brine component of the desalination effluent discharged to marine waters must be determined or estimated by an appropriate method with an accuracy of +/- 5 per cent, and records kept of such determinations.
- (C29) Monitoring of seawater influent for pH, temperature, turbidity, and conductivity must involve instrumentation that is continuous, on-line, real-time and be able to be recorded and alarmed.
- (C30) Monitoring of desalination effluent for pH, chlorine, dissolved oxygen concentration and percent saturation, temperature, turbidity, and conductivity must involve instrumentation that is continuous, on-line, real-time and be able to be recorded and alarmed.
- (C31) **Receiving Environment Monitoring Program (REMP)**

A REMP must be developed and implemented to monitor and record the effects of the release of contaminants on the receiving environment whilst contaminants are being discharged, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. For the purposes of the REMP the receiving environment is defined as the waters of the XX and

connected waterways within XX (e.g. Xkm) downstream of the release. (i.e. Port Curtis) that addresses at least the following:

1. Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
2. Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 2009); and
3. Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
4. Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.

(C32) The REMP must be maintained by a person possessing appropriate qualifications and experience in the field of hydrology and surface water monitoring program design.

(C33) The REMP must address but not be limited to the following:

1. Monitoring for any potential adverse environmental impacts caused by the intake or release, particularly in terms of potentially toxic contaminants that may be present in the ROC or Treated Sewage Effluent;
2. Monitoring performance of the diffuser to ensure adequate mixing and dilution;
3. Sampling to determine the extent of the near-field mixing zone at various tidal phases (including the vertical profile) to validate modelling estimates;
4. Monitoring of selected toxicants (including ammonia nitrogen, total and free chlorine, dissolved metals and metalloids likely to be present in intake water) to assess the extent of the compliance of concentrations with water quality objectives and the extent of the toxicity zone,
5. Monitoring of selected physical chemical parameters (including turbidity, pH, dissolved oxygen saturation, conductivity, temperature) that would assist in quantifying the mixing and dilution of the diffusers
6. The locations of monitoring points including monitoring transects away from the outfall of the designated release point as well as control locations;
7. The proposed sampling depths;
8. The frequency or scheduling of sampling and analysis;
9. Any historical datasets to be relied upon;
10. Description of the statistical basis on which conclusions are drawn, and
11. Any spatial and temporal controls to exclude potential confounding factors.

(C34) The REMP must be prepared and submitted in writing to the administering authority within three (3) months prior to discharge occurring.

RELEASE TO LAND

PERMITTED CONTAMINANT RELEASE AND DISCHARGE POINT(S)

(L1) The only contaminant(s) permitted to be released directly or indirectly to land from the petroleum activities are the following releases to <insert designated area>, refer plan XXXX:

1. Treated sewage effluent via the discharge point L1 to <insert designated area>, refer plan XXXX; and



QUALITY CHARACTERISTICS (TREATED SEWAGE EFFLUENT)

- (L2) The release of contaminants from the sewage treatment plant to land must comply, at the sampling and in situ monitoring point(s) specified in Schedule L, Table 1 with each of the limits specified in Schedule C Table 3 for each quality characteristic.
- (L3) Notwithstanding the quality characteristic limits specified in Table 3 Schedule C the effluent released must not have any properties nor contain any organisms or contaminants in concentrations which are capable of causing environmental harm or an environmental nuisance.

SCHEDULE L, TABLE 1 - RELEASE QUALITY CHARACTERISTIC FOR DISCHARGE TO LAND

Release point	Quality characteristics	Release limit	Limit type	Monitoring frequency
L1	Total -N	3 mg/L	50 percentile compliance	Weekly
	Total - N	10 mg/L	maximum	Weekly
	Total -P	0.1 mg/L	50 percentile compliance	Weekly
	Total - P	1 mg/L	maximum	Weekly
	Ammonia -N	1 mg/L	50 percentile compliance	Weekly
	5-day Biochemical Oxygen Demand	<5 mg/L	80 percentile compliance	Weekly
	Suspended Solids	<5 mg/L	80 percentile compliance	Weekly
	pH	6.5 – 8.0	range	Daily
	Faecal Coliforms	5 colonies per 100mL sample	geometric mean	Weekly

ACCESS AND SIGNAGE

- (L4) Signage must be placed around the land irrigation area and irrigation equipment warning the public that the area and equipment has been set aside for irrigation by treated effluent, which is not to be used for drinking purposes. The signs must be maintained in a visible and legible condition.
- (L5) Any treated effluent irrigation area must, not be used for:
- recreational activities or as a traffic thoroughfare during irrigation; and
 - any activity which may involve members of the public or employees without appropriate personal protective equipment coming in contact with treated wastewater during irrigation periods and for at least four hours after irrigation has ceased or until irrigated vegetation has dried.

WET WEATHER STORAGE

- (L6) Sufficient wet weather storage should be provided for a 3 month period.

WASTEWATER RELEASE CONTROL

- (L7) When weather conditions or soil conditions preclude the irrigation of treated effluent the treated effluent must only be discharged at location DF1 identified in Schedule X, refer plan and when wet weather storage is at capacity
- (L8) Treated sewage effluent must not be irrigated when weather or soil conditions would cause run-off or ponding of any wastewater irrigated.
- (L9) The amount of treated sewage effluent irrigated must be matched to the water requirements of the vegetation irrigated, without exceeding a reasonable estimation of the field capacity of the soil, in the root zone, in the irrigation area.

- (L10) The rate of application of treated sewage effluent to the release area must not exceed the capacity of the soil in the contaminant release area to absorb it.

BUFFER DISTANCES

- (L11) The irrigation of treated effluent must be carried out with a sufficient buffer distance to comply with conditions in schedule B, schedule C and schedule D of this Development Permit.

SUPPLY OF TREATED EFFLUENT FOR THE PURPOSE OF IRRIGATION

- (L12) The holder of the environmental authority is responsible for the quality of the treated effluent released to other parties for the purpose of irrigation. The quality of the effluent must comply, at the sampling point specified, with each of the release limits specified in schedule L,, Table 1 - *Release Quality Characteristic for Discharge to Land* for each quality characteristic.
- (L13) Copies of agreements to supply treated sewage effluent from the Sewage Treatment Plant for the purpose of irrigation must be forwarded to the administering authority within thirty (30) days of the date of their ratification.

WASTEWATER DISPOSAL MANAGEMENT PLAN

- (L14) The holder of this environmental authority must prepare a Wastewater Irrigation Management Plan as part of the Environmental Management Plan. The Wastewater Irrigation Management Plan is to be developed in accordance with the "*Interim Guidelines for the Reuse of Reclaimed Wastewater in Queensland, 1996*" produced by the Department of Natural Resources or the "*Draft National Guidelines for Sewerage Systems: Reclaimed Water*" endorsed by NHandMRC in 2000. The Wastewater Irrigation Management Plan should address at least, but not be limited to, the following matters:
- (a) the measurement of the quantity and quality of treated effluent produced by the activity;
 - (b) an assessment of the suitability of the area of land available for wastewater irrigation;
 - (c) the definition and clear identification of areas to be used for wastewater irrigation;
 - (d) carrying out daily time step modelling (using MEDLI or similar) to estimate at least wastewater irrigation application rates, the wastewater irrigation area required and the volume of wet weather storage required, taking into account at local tropical climatic conditions, soils in the wastewater irrigation area and the vegetation grown in the wastewater irrigation area;
 - (e) an assessment of surface waters, including stormwater, that may be affected;
 - (f) an assessment of the characteristics of the soils in the wastewater irrigation area including assessment of nutrient and salt levels of the soils in the disposal area and how soils will be managed;
 - (g) an assessment of the potential impacts of odour resulting from wastewater irrigation; and
 - (h) management of human and fauna health issues associated with the irrigation of wastewater.
- (L15) Prior to discharge of wastewater to land the holder of this environmental authority must lodge a copy of the Wastewater Irrigation Management Plan with the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.

MAINTENANCE OF STORMWATER MANAGEMENT DEVICES

- (L16) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering the LNG facility footprint.
- (L17) All stormwater management devices must be installed and maintained to ensure they are working properly at all times, including the following:
- a) oil and grit separator devices;
 - b) detention basin(s);
 - c) grass swales; and
 - d) trash racks and protected risers.



CONTAMINANT RELEASES TO GROUNDWATER

- (L18) There must be no release of contaminants to groundwater.

SCHEDULE D—NOISE MANAGEMENT

- (D1) Noise from the LNG plant activities must not cause environmental nuisance at any sensitive place or commercial place.
- (D2) When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (D3) If the authority holder can provide evidence through monitoring that the limits defined in Schedule D – Table 1 are not being exceeded then the holder is not in breach of Condition (D1). Monitoring and subsequent analysis must provide:
- (a) determination of $L_{Aeq,15 mins}$ for the LNG plant noise at the noise sensitive place or commercial place;
 - (b) narrow band analysis and the noise 'signature' of the LNG plant to determine the contribution from the LNG plant to the total noise level at the noise sensitive place or commercial place;
 - (c) the level and frequency of occurrence of impulsive or tonal noise;
 - (d) taking measurements of the low frequency noise below 200 Hz;
 - (e) atmospheric conditions including temperature, wind speed and direction; and
 - (f) location, date and time of recording.
- (D4) If monitoring indicates exceedence of the limits in Schedule D – Table 1 due to the contribution from the LNG plant activities, then the holder of this authority must:
- (a) resolve the complaint with the use of appropriate dispute resolution techniques to the satisfaction of the administering authority; or
 - (b) consider Best Practice Environmental Management in instigating noise abatement measures to comply with noise emission limits in Schedule D – Table 1.

SCHEDULE D, TABLE 1 – NOISE COMPONENT LIMITS FOR THE LNG PLANT

Noise component at the following locations:

The conditions for this section should be developed following the detailed information required by the Coordinator-General's Evaluation Report.

Notes: A map showing the exact location of residential noise receptors in the vicinity of Curtis Island will be provided in the environmental authority.

The noise levels in Table 1 apply for the day, evening and night periods since the LNG plant operates continuously on a 24-hour basis.

- (D5) The method of measurement and reporting of noise levels must comply with the latest edition of the Department of Environment and Resource Management's Noise Measurement Manual.

NOISE CONTROL MEASURES

- (D6) The authorised activities must be carried out by such reasonable and practicable means necessary to minimise the noise generated. The measures adopted must be incorporated into the relevant procedure(s) implemented under the Environmental Management Plan required

by condition (A8) and must include, but not necessarily be limited to, the following noise abatement measures:

- i) ensure that any equipment to be used on the site is assessed for potential noise nuisance impacts and appropriately attenuated;
- ii) low frequency components at the plant including the gas turbine are to be attenuated according to Australian standards and Best Practice Environmental Management;
- iii) ensure that engine cowlings and high efficiency silencers are fitted to all the engines of all plant and equipment identified as impacting on noise sensitive receivers; and
- iv) where operation of reversing beepers is likely to cause environmental nuisance, taking measures to ensure mitigation of the environmental nuisance, for example by de-tuning the reversing beepers, replacing the reversing beepers with other warning devices and/or replacing reversing beepers with alternative reversing beepers which adjust their noise level output in accordance with the prevailing background noise level.

LOW FREQUENCY NOISE

- (D7) Notwithstanding condition (D1) and the limits specified in Table 1 in condition D4, emission of any noise below 200 Hz must not cause an environmental nuisance.
- (D8) Low frequency noise from the LNG plant is NOT considered to be a nuisance under condition (D7) if monitoring shows that noise emissions do not exceed the following limits:
 - c) 50 dB(Z) measured inside the noise sensitive place or commercial place; and
 - d) the difference between the internal A-weighted and Z-weighted noise levels is no greater than 15 dB.

SCHEDULE E – WASTE MANAGEMENT

- (E1) Waste generated in the carrying out the activities must be stored, handled and transferred in a proper and efficient manner. Waste must not be released to the environment, stored, transferred or disposed contrary to any condition of this authority.
- (E2) The holder of this authority must ensure that activities authorised under this environmental authority do not result in the release or likely release of a hazardous contaminant to land or waters.
- (E3) The holder of this authority must ensure that all general waste produced from the conducting of the activities under this environmental authority is removed and disposed of at a facility that is permitted to accept such waste.
- (E4) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility that is permitted to accept such waste.
- (E5) When regulated waste is removed from within the boundary of the authorised facility and transported by the holder of this authority, a record must be kept of the following:
 - a) date of waste transport
 - b) quantity of waste removed and transported
 - c) type of waste removed and transported
 - d) quantity of waste delivered
 - e) any incidents (e.g. spillage) that may have occurred en route.
- (E6) Regulated waste is not permitted to be disposed on site, including septic waste, sewage, and concentrate and back wash water from the reverse osmosis plant.



SCHEDULE F – LAND MANAGEMENT

EROSION AND SEDIMENT CONTROL PLANS

- (F1) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority.
- (F2) Appropriate measures to achieve compliance with condition (F1) for the petroleum activity must be described in the EM plan and include:
1. diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater
 2. contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority
 3. roofing or minimising the size of areas where contaminants or wastes are stored or handled
 4. using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters
 5. erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters
 6. an inspection and maintenance program for the erosion and sediment control features;
 7. provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March
 8. identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (F3) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- (F4) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (F5) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

ACID SULFATE SOILS

- (F6) The holder of this authority must conduct an acid sulfate soils (ASS) investigation prior to construction and in accordance with the requirements of the State Planning Policy 2/02 *Development involving Acid Sulfate Soils* and relevant guidelines such as the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998*.
- (F7) Acid sulfate soils must be managed in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* such that contaminants are not directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters.
- (F8) As soon as practicable and within 3 (three) months of cessation of authorised activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the NEPM where land has been subject to contamination caused by activities authorised under this authority;

PEST AND WEED SPECIES

- (F0) Pest and weed species must be managed to prevent their growth and proliferation.

MANAGEMENT OF FAUNA

- (F10) The holder of this authority must develop and implement, within three (3) months from the date of this approval, a Fauna Management Plan that details how the holder will ensure that authorised activities are undertaken to minimise the potential risk of causing harm to fauna.
- (F11) The holder of this authority must minimise lighting disturbance to marine turtles by:
- a) physically shielding lights and directing the lights onto work areas
 - b) keeping light heights as low as practicable
 - c) using long wave length lights instead of short wavelength lights unless required for the safe operation of the LNG Facility
 - d) minimising reflective surfaces
 - e) fitting motion detectors and light timers where practicable.

SCHEDULE G – STORAGE AND HANDLING OF CHEMICALS, FLAMMABLE AND COMBUSTIBLE SUBSTANCES

- (G1) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids (including petroleum products and associated piping and infrastructure) must be stored and handled in accordance with the relevant Australian Standard where such is available.
- (G2) Notwithstanding the requirements of any Australian Standard and any other relevant Australian or State legislation, any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110 per cent of a single storage tank or 100 per cent of the largest storage tank plus 10 per cent of the second largest storage tank in multiple storage areas; and
 - b) drum storages must be bunded so that the capacity and construction of the bund is sufficient to contain at least 25 per cent of the maximum design storage volume within the bund.
- (G3) All containment systems must be roofed and designed to minimise rainfall collection within the system.

SCHEDULE H - PETROLEUM INFRASTRUCTURE

- (H1) All infrastructure (including buildings, structures, petroleum equipment and plant erected and/or used for the authorised activities) but excluding the Material Offload Facility and haul road, authorised under this authority must be removed from the relevant environmental authority prior to surrender of this authority, except where agreed in writing by the administering authority and the current landowner.
- (H2) Prior to the commencement of decommissioning or abandonment activities, the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.

SCHEDULE I – MONITORING PROGRAMS

- (I1) The holder of this authority must:
- a) develop and implement a monitoring program, within six (6) months from the date of this approval or three (3) months from commencement of construction activities, that will demonstrate compliance with the conditions in this authority
 - b) document the monitoring and inspections carried out under the program and any actions taken.



- (12) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conducts all monitoring required by this authority.
- (13) The holder of this authority must record, compile and keep for a minimum of five (5) years all monitoring results required by this authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation should be kept until the administering authority has accepted surrender of the environmental authority.
- (14) Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this authority must be reviewed for performance and amended if required on an annual basis.
- (15) An annual monitoring report must be prepared each year and presented in the format requested (including electronic) to the administering authority when requested. Information and results held by the administering authority in relation to this approval may be used for any purpose including supply to third parties. This report shall include but not be limited to:
 - a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results
 - b) an evaluation/explanation of the data from any monitoring programs
 - c) a summary of any record of quantities of releases required to be kept under this authority
 - d) a summary of the record of equipment failures or events recorded for any site under this approval
 - e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

SCHEDULE J – COMMUNITY ISSUES

- (J1) When the administering authority advises the holder of a complaint alleging environmental nuisance, the holder must investigate the complaint and advise the administering authority in writing of the action proposed or undertaken in relation to the complaint.
- (J2) When requested by the administering authority, the holder of this authority must undertake monitoring specified by the administering authority, within a reasonable and practicable timeframe nominated by the administering authority, to investigate any complaint of environmental harm at any sensitive or commercial place.
- (J3) The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within fourteen (14) days of completion of the investigation, or receipt of monitoring results, whichever is the latter.
- (J4) If monitoring in accordance with Condition (J2), indicates that emissions exceed the limits set by this authority or are causing environmental nuisance, then the holder of this authority must:
 - a) address the complaint including the use of appropriate dispute resolution if required; and/or
 - b) as soon as practicable implement abatement or attenuation measures so that noise, dust, particulate or odour emissions from the authorised activities do not result in further environmental nuisance.
- (J5) Maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
- (J6) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
 - a) name, address and contact number for complainant;
 - b) time and date of complaint
 - c) reasons for the complaint

- d) investigations undertaken
 - e) conclusions formed
 - f) actions taken to resolve complaint
 - g) any abatement measures implemented
 - h) person responsible for resolving the complaint.
- (J7) The holder of this authority must retain the record of complaints required by this condition for five (5) years.

SCHEDULE K – NOTIFICATION PROCEDURES

- (K1) The holder of this authority must telephone the Department of Environment and Resource Management's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants or any event where environmental harm has been caused or may be threatened not in accordance with the conditions of this authority.
- (K2) Subject to Condition (K1), the holder of this authority is required to report in the case of uncontained spills (including hydrocarbon, contaminated water or mixtures of both) of the following volumes or kind:
- a) releases of any volume to water
 - b) releases of water contaminated with hydrocarbons of volume greater than 200L to land
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.
- (K3) The notification of emergencies or incidents as required by Conditions number (K1 and K2) must include but not be limited to the following:
- a) the authority number and name of holder
 - b) the name and telephone number of the designated contact person
 - c) the location of the emergency or incident
 - d) the date and time of the release
 - e) the time the holder of the authority became aware of the emergency or incident
 - f) the estimated quantity and type of any substances involved in the incident
 - g) the actual or potential suspected cause of the release
 - h) a description of the effects of the incident including the environmental harm caused, threatened, or suspected to be caused by the release
 - i) any sampling conducted or proposed, relevant to the emergency or incident
 - j) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (K4) Within fourteen (14) days following the initial notification of an emergency or incident or receipt of monitoring results, whichever is the later, further written advice must be provided to the administering authority, including the following:
- a) results and interpretation of any samples taken and analysed
 - b) outcomes of actions taken at the time to prevent or minimise environmental harm
 - c) proposed actions to prevent a recurrence of the emergency or incident.
- (K5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the emergency or incident, which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.



Appendix 5

Jurisdiction table for conditions

Appendix	Approval	Condition number	Agency for jurisdiction
1—Part 1	Coordinator-General imposed conditions – whole project	All	Department of Infrastructure and Planning, Significant Projects Coordination Compliance Unit
1—Part 2	Coordinator-General Imposed Conditions – Transport	1, 2, 5,	Gladstone Ports Corporation
1—Part 2	Coordinator-General Imposed Conditions – Transport	6, 12	Gladstone Regional Council
1—Part 2	Coordinator-General Imposed Conditions – Transport	3, 7, 8, 9, 10, 12, 16	Department of Transport and Main Roads
1—Part 2	Coordinator-General Imposed Conditions – Transport	4, 15	Department of infrastructure and Planning – Significant Projects Coordination Compliance Unit
1—Part 2	Coordinator-General Imposed Conditions – Transport	17	Department of Infrastructure and Planning – State Development Areas
1—Part 2	Coordinator-General Imposed Conditions – Transport	13	Department of Environment and Resource Management
1—Part 2	Coordinator-General Imposed Conditions – Transport	14	Maranoa Regional Council
1—Part 2	Coordinator-General Imposed Conditions – Transport	11	Gladstone Regional Council, Banana Shire Council, Central highlands Regional Council, Maranoa Regional Council
1—Part 3	Coordinator-General Imposed Conditions – Social Impact	All	Department of Infrastructure and Planning – Social Impact Assessment Unit

2—Part 1	Coordinator-General Imposed Conditions – Gas Fields	1, 3, 6, 7, 8, 9, 10, 12	Maranoa Regional Council
2—Part 1	Coordinator-General Imposed Conditions – Gas Fields	2, 4, 5	Department of Environment and Resource Management
2—Part 1	Coordinator-General Imposed Conditions – Gas Fields	11	Department of Community Safety
2—Part 1	Coordinator-General Imposed Conditions – Gas Fields	6	Department of Infrastructure and Planning, Compliance Section
2—Part 2	Environmental Authority – Gas Fields	10 - 16	Department of Environment and Resource Management
2—Part 3	Environmental Authority – Model Conditions	All	Department of Environment and Resource Management
3—Part 1	MCU – Gas Pipeline	All	Department of Infrastructure and Planning – State Development Areas
3—Part 2	Coordinator-General Imposed conditions – Gas pipeline	1, 10, 11, 12, 14, 15, 16,	Gladstone Regional Council, Banana Shire Council, Central highlands Regional Council, Maranoa Regional Council
3—Part 2	Coordinator-General Imposed Conditions – Gas Pipeline	2, 3, 6, 7 8, 9, 17,	Department of Environment and Resource Management
3—Part 2	Coordinator-General Imposed Conditions – Gas Pipeline	4, 5,	Department of Transport and Main Roads
3—Part 2	Coordinator-General Imposed Conditions – Gas Pipeline	13	Queensland Health
3—Part 2	Coordinator-General Imposed Conditions – Gas Pipeline	14	Department of Community Safety
3—Part 2	Coordinator-General Imposed Conditions – Gas Pipeline	18 - 26	Department of Infrastructure and Planning, Significant Projects Coordination Compliance Unit



3—Part 3	Coordinator-General Imposed Environmental Conditions – Gas Pipeline	All	Department of Infrastructure and Planning, Significant Projects Coordination Compliance Unit
3—Part 4	Environmental Authority – Gas Pipeline	All	Department of Environment and Resource Management
4—Part 1	MCU - LNG Facility	All	Department of Infrastructure and Planning – State Development Areas
4—Part 2	Coordinator-General Imposed Conditions – LNG Facility	All	Department of Infrastructure and Planning, Significant Projects Coordination Compliance Unit
4—Part 3	Coordinator-General Imposed Environmental Conditions – LNG Facility	All	Department of Infrastructure and Planning, Significant Projects Coordination Compliance Unit
4—Part 4	Environmental Authority – LNG Facility	All	Department of Environment and Resource Management

Glossary of terms and acronyms

Term/Acronym	Definition
APLNG	Australia Pacific liquefied natural gas
CASA	Civil Aviation Safety Authority
CEMP	Construction environment management plan
CICSDA	Callide Infrastructure Corridor State Development Area
Commencement of construction	Includes site clearing, earthworks and structural activity
CSG	Coal seam gas
Day	Calendar day
DEEDI	Department of Employment, Economic Development and Industry
DERM	Department of Environment and Resource Management
DIP	Department of Infrastructure and Planning
DTMR	Department of Transport and Main Roads
EC	Electrical conductivity
Ecofund Queensland	Ecofund is a Queensland Government sponsored facility which provides services to project proponents to meet regulatory environmental offset requirements and to purchase carbon offsets.
EIS	Environmental Impact Statement
EMP	Environmental management plan
EPA	Environmental Protection Agency
EPBC	Environmental Protection and Biodiversity Conservation Act 1999
EPC	Engineering, Procurement and Construction
FEED	Front end engineering design
FIFO/DIDO	Fly-in fly-out/drive-in-drive out
FLPE	Fisherman's Landing Port Expansion
GBRWHA	Great Barrier Reef World Heritage Area
GLNG	Gladstone liquefied natural gas
GPC	Gladstone Ports Corporation
GRC	Gladstone Regional Council
GSDA	Government state development area
GSDACIIP	Gladstone State Development Area Curtis Island Industry Precinct
HICB	Hazardous industry and chemicals branch
HDD	Horizontal directional drilling
JAG	Justice and Attorney-General
kPa	kilopascal
LNG	Liquefied Natural Gas



LNG Facility	LNG production plant and marine loading and unloading facilities, worker accommodation, materials and supplies, transport, worker and safety infrastructure, located at the Santos GLNG site on Curtis Island
LNGC	LNG carriers
LOA	Length over all
max $L_{PZ,15 \text{ min}}$ min	means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.
MNES	Matters of national environmental significance
MOF	marine offloading facility
MRC	Maranoa Regional Council
MCU	Material change of use
NCA	Nature Conservation Act
PLF	product loading facility
Project commitment	
QCLNG	Queensland Curtis liquefied natural gas
QGEOP	Queensland Government Environmental Offsets Policy
RCCC	Regional Community Consultation Committee
RIA	Road impact assessment
RMP	Road-use management plan
ROC	Reverse Osmosis Concentrate
ROW	Right of way
SALNG	Shell Australia Liquefied Natural Gas
SEIS	Supplementary Environmental Impact Statement
SIA	Social Impact Assessment
The Narrows	Part of Gladstone Harbour from Friend Point on the mainland to Laird Point on Curtis Island
TDS	Total dissolved solids
TWAF	Temporary workers accommodation facility
$\mu\text{S/cm}$	Microsiemens per centimetre
void	means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).
waters	includes all or any part of a creek, river, stream, lake, lagoon, dam, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and underground water.
WBDDP	Western Basin Dredging and Disposal Project
WICT	Wiggins Island Coal Terminal

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