



The Coordinator-General



Australia Pacific LNG Project

Coordinator-General's report on the environmental impact statement

November 2010



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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* (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) process for the Australia Pacific LNG (APLNG) project. The Department of Infrastructure and Planning (DIP) managed the impact assessment process for this project on behalf of the Coordinator-General 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 information on 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.

APLNG proposes to develop a world scale long-term coal seam gas (CSG) to liquefied natural gas (LNG) project in Queensland. The 30-year project has the following objectives:

- development of the Walloons gas fields in the Surat Basin in south central Queensland with up to 10,000 CSG wells over the 30 year timeframe
- construction and operation of a 450 km gas transmission pipeline to connect the Walloons gas fields with the LNG facility
- construction and operation of an LNG facility (of up to four production trains) at Laird Point on Curtis Island near Gladstone for production and export of up to 18 million tonnes per annum (Mtpa) of LNG.

APLNG is seeking approval for the fully developed project, incorporating the above elements, through this EIS process.

APLNG is a 50:50 joint-venture between Origin Energy and Conoco-Phillips.

On 9 April 2009, the Queensland Coordinator-General (CG) declared the APLNG project to be a significant project for which an EIS is required under the SDPWO Act.

The project was referred to the Commonwealth in accordance with Chapter 4 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as three separate referrals covering the gas fields, pipeline and LNG facility. In each case, the actions were determined as controlled actions likely to have a significant impact on matters of national environmental significance (MNES). As a result, the project will require formal assessment and approval under the EPBC Act. The Australian Government has a bilateral agreement in place with the Queensland Government which accredits the environmental assessment process under the SDPWO Act. This allows the SDPWO Act EIS assessment process to meet the requirements of both jurisdictions.

Draft terms of reference for the EIS (TOR) were advertised by the CG on 29 August 2009 and the final TOR issued to APLNG on 3 December 2009.

APLNG lodged a draft EIS with the CG on 29 January 2010 which was reviewed against the TOR. Following some amendments, the final EIS was approved for release by the CG and was publicly advertised for a five week period from 27 March 2010 until 4 May 2010.

Following a review of submissions, the CG sought supplementary information from APLNG pursuant to section 35(2) of the SDPWO Act. This supplementary information was supplied on 16 August 2010.

The following outlines the major issues identified from the EIS process and how they are dealt with in this report:



1. Accommodation on Curtis Island

APLNG proposes a temporary workers accommodation facility (TWAF) for 2,640 workers adjacent to the LNG plant. Although accommodation facilities are not a preferred land use in the Curtis Island Industry Precinct, of the Gladstone State Development Area (GSDA), previous LNG proponents, Gladstone LNG (GLNG) and Queensland Curtis LNG (QCLNG), have submitted plans for a TWAF on their LNG plant sites. Potential cumulative impacts of a workforce of 8,000 to 10,000 from up to four LNG projects in Gladstone and their daily movement on land and across the harbour indicates that the use of temporary workers accommodation facilities on Curtis Island is warranted for most of the fly in fly out workforce. It is considered that impacts can be managed and that the size and duration of this facility will be taken into account, when the material change of use application for the LNG facilities on Curtis Island in the GSDA is considered.

2. Crossing of The Narrows

Potential cumulative impacts from up to four gas transmission pipeline routes from LNG projects proposed between 2010 and 2013, crossing through the Kangaroo Island wetlands and The Narrows, all located within the Great Barrier Reef World Heritage Area, strongly indicates that a bundled pipeline trenched construction methodology should be adopted by all proponents as far as practicable. This will allow all pipelines and possibly water supply, sewerage, power and telecommunications, if feasible, to be positioned in the one location. Co-location of pipelines will minimise potential acid sulfate soil disturbances, reduce significant harm to flora and fauna and allow for effective environmental management and monitoring.

Reports on crossing of the wetlands and The Narrows have been received from GLNG and QCLNG pursuant to conditions in those CG reports and advice received from both APLNG and Arrow CSG Australia Ltd (ACSG) outlining their position in relation to a bundled pipeline approach. It is noted that APLNG in its advice has indicated a preparedness to participate in a bundled pipeline construction and seeks approval for a single stand-alone pipeline should a bundled approach not proceed.

These reports and advice are currently being assessed, following which, the CG will give a decision on requirements for co-locating pipelines and construction sequencing for those sections of the pipelines across the wetlands and The Narrows. Therefore the assessment of impacts of the APLNG pipeline section across the Kangaroo Island wetlands and The Narrows is not part of this report.

3. Transport logistics in Gladstone and Gas Fields areas

The proponent's supplementary information outlined that the proponent is committed to using rail to transport the bulk of pipe segments that will land at the Port of Gladstone. The proponent is negotiating with Queensland Rail on a satisfactory outcome. APLNG's approach is supported to transport pipe segments to Biloela by rail and thereafter by road to the pipeline right of way. Such an approach will substantially reduce cumulative road impacts in the Gladstone area and the project has been conditioned to this end apart from the transport of pipe segments within 60 km of Gladstone which may be transported by road.

Although most workers will be located in TWAFs on Curtis Island, there will still be daily transport across the harbour, and on land within Gladstone for staff and all materials and equipment required for construction and operation of the LNG facility. Therefore there is a need to develop a coherent logistics plan for these transport tasks, and for these to be integrated with those of other LNG projects. The proponent is therefore required to prepare a Gladstone Logistics Plan to cover land-based transport tasks in conjunction with the Gladstone Regional Council (GRC), Department of Transport and Main Roads (DTMR), the Gladstone Ports Corporation (GPC) and other LNG proponents. A separate Marine Traffic Management Plan must be developed in conjunction with DTMR, GPC and other LNG proponents to govern the movement of persons and materials across the harbour.

Similarly there will be substantial transport tasks to be undertaken in the broader Surat gas fields area covering personnel and materials, various transport modes and potentially involving four LNG projects over similar development time frames. There is therefore a need to develop a transport logistics plan for the region and APLNG has been conditioned accordingly.



4. Impact of flare and plumes on air space around Gladstone Airport

Gas flaring and plumes from the LNG site create potential operational limitations on Gladstone Airport. Given other LNG facilities are also planned for Curtis Island, there is a need to see a cumulative impact assessment on aviation airspace and whether this will affect Gladstone airport operations. The proponent is therefore required to commit to an undertaking to ensure that its gas flaring will not interfere unduly with the operation of air traffic. The proponent has been conditioned 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 the Civil Aviation Safety Authority (CASA) and GRC on limitations, if any. APLNG has committed to participate in the study. It is noted that APLNG has chosen to use lower impact ground flares compared to stack flares proposed by some other LNG proponents.

5. Cumulative impacts of transport on roads

The APLNG 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 consequent cumulative impacts for communities and regions, including state and local road networks. A proposal has been implemented to require 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. APLNG has agreed to participate in the study.

6. Strategies for managing groundwater and CSG water

APLNG has submitted a strategy for managing CSG water which covers various options including discharge of treated water to watercourses that meets environmental flow objectives and mimics pre-development stream flows, aquifer injection and beneficial reuse options such as agricultural and commercial uses and potential drinking water supplies. This approach accords with the Queensland government's CSG water management policy and guidelines.

APLNG's initial five year operational plan covers treated CSG water (permeate) production from three water treatment facilities and its CSG water management approach is based on discharge of permeate to watercourses as well as agricultural (irrigation) use. The proponent is also examining and developing other options including aquifer injection. The approach is adaptive and allows the state to set appropriate conditions at each five year operational plan development stage having regard to previous environmental performance, results of studies completed and commercial realities.

The adaptive management strategy is considered appropriate and one where environmental impacts can be appropriately managed.

In regard to groundwater modelling and management, APLNG has developed a comprehensive groundwater model and bore monitoring network. Both of these elements are integral to APLNG identifying any groundwater impacts from its activities and implementing appropriate management or mitigation responses and 'making good' supplies in accordance with State policies. The CG report requires that APLNG's monitoring and modelling information be made available to DERM and ultimately the Queensland Water Commission for its analysis of regional groundwater modelling and cumulative impacts. The State has foreshadowed that it will assume responsibility for regional groundwater monitoring, modelling and preparation of cumulative impact reports through the Commission.

It is noted that on 22 October 2010, the Commonwealth approved the GLNG and QCLNG projects subject to a range of conditions including an adaptive CSG water management approach. Whilst there are minor differences in matters of process detail, the broad thrust of the policy directions for CSG water and groundwater management of both jurisdictions is similar.

7. Development approval for trains 3 and 4 of LNG facility

APLNG is seeking approval for the ultimate development of its project which, in the case of the LNG facility, involves the construction of four trains producing a total of 18 Mtpa of LNG. The project is, however, to be staged, with trains 1 and 2 scheduled for construction in 2014/2015 and construction of trains 3 and 4 at a future date subject to market conditions and gas field development. Indications from APLNG are that trains 3 and 4 could come online around 2017/2018.



To overcome potential issues of the lapsing of this report (usually four years after its release) and in the event that a material change of use approval has not been secured for trains 3 and 4, the CG is prepared to extend the currency period of this report for a further two years provided that APLNG advises within the current period of the report, that it has decided to proceed with construction of a subsequent train/s and provides satisfactory supporting documentation.

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

The Queensland government now requires major resources projects to conduct a rigorous social impact assessment (SIA), conforming to published guidelines. The SIA must include information relevant to the social and cultural area, community engagement, a social baseline study, a workforce profile, potential impacts, both positive and negative, and proposed mitigation measures and management strategies.

The proponent has completed a comprehensive SIA during the EIS process and lodged a Social Impact Management Plan (SIMP) as part of its supplementary information. The draft SIMP is largely satisfactory but will require some further refinement and additional information before final approval.

An overarching Industry Leadership Group for CSG Resource Projects is proposed 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.

It is considered that a coordinated approach which promotes collaboration among the proponent, all levels of government and local communities, is appropriate to assist affected local communities to plan and fund the provision of social infrastructure required to address future growth. A social infrastructure and service delivery strategy comprising four integrated elements is proposed:

- proponent's commitments register
- APLNG's SIMP, Community Investment Strategy and associated strategies
- the Social Infrastructure Strategic Plans (SISP) for Gladstone and Maranoa/Western Downs Regions
- specific contributions to manage negative social impacts e.g. housing contributions.

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 CG for approval. It is recognised that APLNG is well advanced in the preparation of this strategy.

It is agreed that the potentially large demand for workers required by the APLNG project is likely to have an effect on the ability of other businesses in the area to attract and retain staff, particularly smaller businesses.

Accordingly, the proponent has been required to establish a Jobs 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.

9. Impacts on Australian Government matters

An assessment of the extent to which the material supplied by APLNG 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 at section 10.

10. Offsets for ecological impacts

It is noted that the project will have unavoidable vegetation clearing requirements, as outlined in the EIS and supplementary material. As such the Queensland government, along with DSEWPC, will require terrestrial and marine ecology offsets to compensate for these unavoidable impacts. It is further noted that the proponent has lodged a draft offsets strategy as part of the supplementary information.

While a five-year gas field operational plan has been provided for gas extraction activities, due to the uncertainty of the extent and location of future gas field development, the full extent of disturbance can



not be determined at this time. Advice from DERM and DSEWPC has identified the following requirements in relation to offsets:

- the proponent is to provide further confirmation of the availability of suitable offset sites
- there is a preference for a significant proportion of the life-of-project offset requirements to be established early on in the project
- there is a preference for a smaller number of larger and strategic offset sites to be established over an approach that uses a large number of small offsets.

The proponent has analysed offsets for the LNG facility, pipeline and CSG 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, habitat for threatened species under NCA and EPBC, and EPBC endangered ecological communities.

Environmental offsets are to be secured by the proponent in a manner that achieves a 'no net loss' of biodiversity outcome, and in an appropriate manner and timeframe. It is required that an environmental offsets program, consistent with Queensland Government Environmental Offsets Policy (QGEOP) must be provided for approval before environmental authorities are issued and that the program be regularly updated and reconciled with actual gas field development and other disturbance as it is implemented. The proponent must note that DSEWPC will also require a comprehensive offsets package.

11. Conclusion

It is considered that the EIS process conducted for the project 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.

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, it is recommend that the APLNG project, as described in detail in the EIS and supplementary information, and summarised in section 2 of this report, can proceed, subject to the recommendations and conditions contained in Appendices 1–4 of this report.

This report will be provided to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities 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.



.....
Graeme Newton
Coordinator-General

8 November 2010



1. Introduction

This report has been prepared pursuant to section 35 of the SDPWO Act and provides an evaluation of the environmental impact statement process for the APLNG project. The EIS was conducted by the proponent, APLNG.

An initial advice statement was lodged with the Coordinator-General on 27 March 2009 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 9 April 2009.

On 6 July 2009, APLNG lodged three separate referrals to the Australian Government under the EPBC Act to cover the project's components: gas fields, pipeline and LNG facility. The Australian Government declared all three referrals to be controlled actions with assessment required under the bilateral agreement whereby the SDPWO Act EIS process is accredited under the EPBC Act.

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, supplementary information provided by APLNG and information and advice from advisory agencies and other parties. The report also states conditions under which the project may proceed and recommendations that seek to highlight matters for consideration.



2. Project description

2.1. The proponent

The project is proposed by APLNG, a 50:50 joint venture between Origin Energy Limited (Origin) and ConocoPhillips. The project brings together two companies with extensive experience in coal seam gas production for commercial markets and draws on ConocoPhillips' proven track record in the delivery of LNG projects.

APLNG was previously known as Origin Energy CSG Limited and was a wholly-owned subsidiary within the Origin Group. In September 2008, Origin announced that it had selected ConocoPhillips to invest in the joint development of a CSG to LNG project using Origin's CSG reserves and resources in Queensland and ConocoPhillips' Optimized Cascade® Process technology.

The joint venture arrangement sees Origin responsible for the construction and management of the gas fields and associated infrastructure, and the gas pipeline to the LNG facility on behalf of APLNG. ConocoPhillips will be responsible for the construction and management of the LNG facility on behalf of the joint venture partners.

Origin is the largest integrated energy company operating across Australia and New Zealand. Listed in the ASX top 20, the company has more than 4,000 employees. Origin is a leading producer of gas in eastern Australia, the largest owner and developer of gas-fired electricity generation in Australia and a leading wholesaler and retailer of energy. The company services more than three and a half million electricity, natural gas and liquefied petroleum gas customers across Australia, New Zealand and the Pacific.

ConocoPhillips is an international, integrated energy company. As of 30 September 2009, ConocoPhillips was:

- The third-largest integrated energy company in the United States based on market capitalisation, oil and natural gas reserves, and production. ConocoPhillips' current net production is 2.2 million barrels of oil equivalent (BOE) per day from an assets base valued at \$152 billion dollars US
- The fourth-largest refiner in the world
- The seventh-largest worldwide reserves holder of non government-controlled companies with 10 billion BOE of reserves.

ConocoPhillips Australasia, a subsidiary of ConocoPhillips, is an oil and gas exploration and production company, with assets and exploration activities in the Timor Sea, Northern Territory, Western Australia and Timor-Leste.

2.2. Project components

APLNG proposes to develop a world scale long-term CSG to LNG project in Queensland. The 30 year project has the following objectives:

- Development of the Walloons gas fields in the Surat Basin in south central Queensland with up to 10,000 CSG wells.
- Construction and operation of a 450 km main gas pipeline to connect the Walloons gas fields with the LNG facility near Laird Point.
- Construction and operation of an LNG facility near Laird Point on Curtis Island near Gladstone for production and export of approximately 18 Mtpa of LNG. APLNG is seeking full development approval for the above elements through this EIS process.



Gas fields

The Walloons gas fields cover an area of approximately 570,000 ha within petroleum tenures held by APLNG. The gas fields are located within the local government boundaries of the Maranoa, Western Downs and Toowoomba Regional Councils. The gas fields will be progressively developed over a 30 year timeframe and will ultimately require the following infrastructure:

- up to 10,000 wells
- underground gas and water gathering networks
- water transfer stations
- gas processing facilities
- water treatment facilities
- brine ponds
- underground high pressure gas pipeline network
- warehouses and administration buildings.

Associated infrastructure includes: access roads, telecommunications, sewage infrastructure and temporary and permanent accommodation facilities.

Further details on the gas field development are provided in section 7 of this report.

Gas pipeline network

A buried high pressure gas pipeline network will transport dehydrated and compressed CSG from the Walloons gas fields to the LNG facility on Curtis Island. The gas pipeline network will consist of:

- A 44km lateral connecting the Condabri and southern development areas with the main gas pipeline
- A 38km lateral connecting the Woleebee and western development areas with the main gas pipeline
- A 362km main gas pipeline from the junction with the laterals east of Wandoan to the LNG facility on Curtis Island, including the marine crossing of The Narrows at Port Curtis
- A high pressure gas pipeline network extending from downstream of the gas processing facilities to the laterals.

As gas field areas are progressively developed over the project's 30 year life, they will be connected to the above laterals through gas field pipeline networks.

The gas pipeline has been designed to meet the 18 Mtpa ultimate capacity of the LNG plant and will comply with applicable Australian and industry standards including AS2885 and the Australian Pipeline Industry Association's Code of Environmental Practice. Construction will take approximately 18 months and is scheduled to commence in 2012.

The gas pipeline will also require above ground facilities which will be enclosed within secure fencing and include isolation valves, scraper launchers and receivers and instrumentation for control and monitoring.

Further details on the gas pipeline are provided in section 8.1.

LNG facility

The LNG facility will involve construction and operation of the following major components:

- An inlet feed gas metering facility (including filtration, pre-heating and metering)
- An LNG plant which comprises:
 - Gas processing facilities to remove impurities and refrigerate the CSG
 - Product storage tanks
 - Plant infrastructure and utilities
- A materials off-loading facility which will also serve as a ferry terminal for the transfer of construction materials and heavy equipment to the project site



- Jetty and loading berth(s) to transfer LNG product to tankers for shipping to market or receipt of shipments of LPG
- A temporary rock dock, a roll-on roll-off dock and a construction ferry dock
- A temporary accommodation facility
- Mainland storage and marine facilities for loading of materials and personnel.

Standard infrastructure services (power, water, telecommunications and sewage disposal) will also need to be established.

The LNG facility will be developed in stages to a maximum ultimate capacity of approximately 18 Mtpa of LNG involving four production trains, each of approximately 4.5 Mtpa

Further details on the LNG facility are provided in section 9.1.

2.3. Project rationale

Governments world-wide are supporting the use of gas as a transitional fuel to meet energy needs as the world moves towards a carbon-constrained economy¹. Demand for gas is expected to rise in domestic and international markets. The Australian Bureau of Agricultural and Resource Economics (ABARE) has estimated the ultimate potential CSG resource in eastern Australia could be 250 trillion cubic feet, which is more than sufficient to meet domestic and international needs.

The APLNG project will enable the creation of a world-scale LNG export industry in Queensland, utilising its CSG resources. It will diversify the State's economic base and generate jobs and further investment in Queensland.

The EIS reported that demand for, and acceptance of, CSG as a significant and viable long-term resource in Australia has undergone a dramatic shift in recent years due to:

- The Queensland Gas Scheme, whereby the Queensland Government mandated that Queensland electricity retailers are required to source a percentage of their electricity from gas fired generation
- The acceptance of gas as the key transitional fuel to a lower carbon intensity economy
- Growth in domestic demand for gas, particularly through the development of gas-fired power stations
- The scale and economic viability of the CSG resource becoming more apparent as ongoing drilling programs have demonstrated substantial increases in reserves and identified other resources, particularly in Queensland
- The success of Australian companies in the development of CSG resources has led to significant financial investments by major international energy companies including ConocoPhillips, Santos, PETRONAS, BG Group and Shell
- Rising global energy demand has opened up the potential for development of an LNG export industry from Queensland using CSG as the feedstock.

LNG is becoming a major export product for Australia with export income estimated at \$9.9 billion AUD 2008–2009 (ABARE 2009). Australia has become an important world supplier for nations seeking secure energy supplies produced in a stable economic and political environment. Australia is forecast to increase LNG exports to 18.2 million tonnes in 2009–2010. However due to the economic downturn the value is predicted to drop to \$6.9 billion AUD (ABARE 2009).

APLNG advises that demand is steadily growing because LNG is a safe, flexible, reliable, economic fuel source which produces less carbon emissions than alternative energy sources such as coal. In 2009, global demand for LNG is expected to remain constant at approximately 171 million tonnes due to a decrease in demand from northern Asia and an increased demand within the European Union (ABARE 2009). ABARE has forecast the LNG trade to increase to 181 million tonnes in 2010. The global demand for LNG is predicted to reach between 245 and 340 Mtpa by 2015.

¹ EIS Vol 1, ch 1, section 1.4



Economic benefits² that will result from the project include:

- An investment of \$35 billion AUD through to 2020
- An annual increase of approximately \$1.3 billion AUD in Gross Domestic Product
- An annual increase of approximately \$2 billion AUD to Queensland's Gross State Product
- The creation of approximately 9,900 jobs (direct and indirect) and specifically 7,600 jobs direct and indirect) in Queensland during the construction phase
- Opportunities to increase local skills capacity via apprenticeships, scholarships and vocational training and training programs.
- The creation of a new export industry for Queensland
- The commercialisation of APLNG's gas reserves—the largest portfolio of independently certified CSG reserves and resources in Australia
- The diversification of state and local economies
- Greenhouse gas emissions avoidance
- Generation of extra royalties and tax revenue.

² EIS ch1, section 1.4.2



3. Impact assessment process

The Department of Infrastructure and Planning 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 CG on 27 March 2009 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 9 April 2009.

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 EPBC Act. On 6 July 2009 the proponent referred the project to the Australian Government Minister for the Environment, Heritage and the Arts under the EPBC Act as three EPBC Act referrals based on the gas fields, pipeline and LNG facility.

The Minister subsequently determined that each of the referrals was a controlled action because of possible impacts on matters of national environmental significance (MNES). The Minister further determined that assessment be undertaken pursuant to the bilateral agreement. Relevant controlling provisions were identified as:

- Gas fields—referral no. 2009/4974
 - Wetlands (Ramsar) (sections 16 and 17B)
 - Listed threatened species and communities (sections 18 and 18A)
 - Listed migratory species (sections 20 and 20A)
- Gas pipeline—referral no. 2009/4976
 - World Heritage properties (sections 12 and 15A)
 - National Heritage places (sections 15B and 15C)
 - Listed threatened species and communities (sections 18 and 18A)
 - Listed migratory species (sections 20 and 20A)
- LNG facility and ancillary facilities—referral no. 2009/4977
 - World Heritage properties (sections 12 and 15A)
 - National Heritage places (sections 15B and 15C)
 - Listed threatened species and communities (sections 18 and 18A)
 - Listed migratory species (sections 20 and 20A).

As a result, the project will require formal assessment and approval under the EPBC Act. The bilateral agreement in place between the Australian and Queensland Governments accredits the environmental assessment process under the SDPWO Act. This allows a single assessment process to occur to meet the requirements of both jurisdictions.

3.2. Review and refinement of the EIS terms of reference

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 Innovation
- Department of Education and Training



- Department of Infrastructure and Planning
- Department of Justice and Attorney-General
- Department of Premier and Cabinet
- Department of Transport and Main Roads
- Department of Environment and Resource Management
- Queensland Health
- Queensland Police
- Queensland Treasury
- Gladstone Regional Council
- Toowoomba Regional Council
- Maranoa Regional Council
- Western Downs Regional Council
- Central Highlands Regional Council
- North Burnett Regional Council
- South Burnett Regional Council
- Gladstone Ports Corporation

The draft Terms of Reference (ToR) were advertised for public and advisory comment on 29 August 2009 in the Weekend Australian, The Gladstone Observer and The Brisbane Courier-Mail. The advertisement was also placed in the Western Star and the Dalby Herald on 1 September 2009 and in the Central Queensland News on 2 September 2009. Release of the draft ToR was also notified on DIP's website from which the draft ToR could be downloaded. Hard copies of the draft ToR were also publicly available for inspection at the office of the Gladstone Regional Council, Western Downs Regional Council and the Maranoa Regional Council.

Advisory agency briefings were held in Brisbane on 15 September 2009 and in Gladstone on 16 September 2009.

The period for receipt of submissions closed on 12 October 2009. A total of 22 submissions were received including 16 from advisory agencies and 6 from non government organisations (NGOs) and members of the public. Copies of all submissions were forwarded to the proponent. The submissions were considered in preparing the final ToR which was approved by the CG and issued to APLNG on 3 December 2009.

3.3. Public review of the EIS

APLNG lodged its draft EIS with the department on 29 January 2010. Following a departmental review of the draft document against the ToR, APLNG incorporated a number of changes and the final EIS was lodged with DIP on 5 March 2010. The CG subsequently approved the release of the EIS which was publicly advertised on 20 March 2010 in the Weekend Australian, The Gladstone Observer and The Brisbane Courier-Mail and on the 23 March 2010 in the Dalby Herald and the Western Star newspapers. The EIS was available for public consultation for approximately five weeks from Monday 27 March to Tuesday 4 May 2010.

Advisory agency briefings were held in Brisbane on 21 April 2010 and in Gladstone on 22 April 2010.

The EIS was available for viewing on the proponent's website as well as the DIP website. A hard copy of the executive summary and DVD version of the EIS was available free of charge from the proponent.

The EIS was also made available for public viewing at:

- Western Downs Regional Library
- Roma Town Library
- Biloela Library
- Gladstone City Library
- State Library of Queensland

A total of 36 submissions were received by DIP, including 18 from government agencies and local councils and 18 from the general public and NGOs. Particulars are as follows:



Government agencies and councils

- Toowoomba Regional Council
- Gladstone Area Water Board
- Gladstone Regional Council
- Maranoa Regional Council
- Western Downs Regional Council
- Gladstone Ports Corporation
- Department of Communities
- Department of Justice and Attorney General—Hazards and Risk
- Qld Police
- Qld Health
- Department of Community Safety
- Central Highlands Regional Council
- Department of Transport and Main Roads
- Department of Employment and Training
- Banana Shire Council
- Department of Employment, Economic Development and Innovation
- Department of Environment and Resource Management
- Department of Environment Protection, Water, Heritage and the Arts (Cwlth)

NGOs

- Qld Murray-Darling Committee Inc
- Carbon Energy Pty Ltd
- Port Curtis Sailing club/Gladstone Yacht Club
- BG Urban solutions
- Wildlife Preservation Society Upper Dawson Branch
- Capricorn Conservation Council
- Qld Seafood
- Qld Curtis LNG
- Qld Wildlife Preservation Society
- QER
- Fitzroy Basin Association
- Lloyds pastoral Co Pty Ltd
- Qld Cultural Heritage & Native Title Management Services Pty Ltd

Private

Submissions were received from five individuals.

3.4. Supplementary work undertaken

Following a review of submissions received on the EIS, the CG decided that no formal supplementary EIS with public review was necessary but that supplementary information should be provided by APLNG pursuant to section 35(2) of the SDPWO Act to assist in the evaluation of the EIS. This additional material included:

- Advice on project changes since the EIS was lodged
- Additional assessment work and studies completed since the EIS was lodged
- Response to issues raised in the EIS submissions
- Briefings of key advisory agencies on the above matters

The briefings of key advisory agencies were conducted over the period from 16 July 2010 to 2 August 2010. Final supplementary information was lodged with DIP on 16 August 2010 and reports on project changes and additional assessment work uploaded to the APLNG website on 17 August 2010 for access by agencies and the public. Responses to issues raised in submissions were forwarded to government and council agencies on the 17 August 2010 while individual letters to NGOs and private parties were variously forwarded in early September 2010.



On 17 August 2010 advisory agencies were also requested to provide advice to the CG on:

- the adequacy of the supplementary material and agency briefing sessions in addressing matters raised in EIS submissions
- any proposed conditions for the Coordinator-General's consideration in preparing the Coordinator-General's evaluation report
- any other advice or comment for the Coordinator-General's consideration in evaluating the project.



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 SDPWO Act. For the project to proceed, a range of approvals under Queensland and Australian Government legislation are required.

The principal project approvals required under Queensland legislation are:

- Environment authorities (petroleum activities) under the *Environmental Protection Act 1994* (EP Act)
- Petroleum authorities under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act)
- Development approvals within State Development Areas under the SDPWO Act
- Development approvals under the *Sustainable Planning Act 2009* (SPA).

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

Section 39 of the SDPWO Act outlines the application of the CG report to SPA and the Integrated Development Approval System (IDAS). The CG report may state for the assessment manager one or more of the following:

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

The project is also a declared action under section 75 of the EPBC Act (refer section 3.1) and will therefore require the approval of the Australian Government Environment Minister under Part 9 of the EPBC Act before the project can proceed.

Table 4.1³ lists the more significant approvals, including those above that the project will require.

Table 4.1—Project approvals

Project approval	Legislation	Government agency	Relevant project area
Coordinator-General's EIS evaluation report	SDPWO Act	Coordinator-General Department of Infrastructure and Planning	Gas fields, gas pipeline and LNG facility
Environmental approvals	EPBC Act	Minister for the Environment	Gas fields, gas pipeline and LNG facility
Environmental authorities for petroleum activities	EP Act	Department of Environment and Resource Management (DERM)	Gas fields, gas pipeline and LNG facility

³ Based on Tables 2.1 and 2.2 in the EIS



Project approval	Legislation	Government agency	Relevant project area
Petroleum survey licence	P&G Act	Department of Employment, Economic Development and Innovation (DEEDI)	Gas fields (proposed pipelines and petroleum facilities), gas pipeline and LNG facility
Petroleum lease	P&G Act	DEEDI	Gas fields
Petroleum pipeline licence	P&G Act	DEEDI	Gas fields and gas pipeline
Petroleum facility licence	P&G Act	DEEDI	Gas fields and LNG facility
Cultural heritage management plan	Aboriginal Cultural Heritage Act 2003	DERM	Gas field, gas pipeline and LNG facility
Development approval for a material change of use under a development scheme (CICSDA and/or GSDA)	SDPWO Act	Coordinator-General	Gas pipeline and LNG facility
Development approval for a material change of use assessable under a planning scheme	SPA	Applicable local government	Gas field, gas pipeline and LNG facility (development off petroleum tenure)
Development approval for a material change of use for a major hazard facility	<i>Dangerous Goods and Safety Management Act 2001</i> SPA	Department of Justice and Attorney General	LNG facility
Development approval for a material change of use for environmentally relevant activities	EP Act SPA	DERM	Gas field, gas pipeline and LNG facility
Development approval for an material change of use on strategic port land	<i>Transport Infrastructure Act 1996</i> SPA	Gladstone Ports Corporation	LNG facility
Development approval for operational works for removal, destruction or damage to a marine plant	<i>Fisheries Act 1994</i> SPA	DEEDI	Gas pipeline and LNG facility
Development approval for operational works that are waterway barrier works if waterway barriers are required	<i>Fisheries Act 1994</i> SPA	DEEDI	Gas fields, gas pipeline and LNG facility
Development approval for operational works that are tidal works	<i>Coastal Protection and Management Act 1995</i> SPA	DERM/ local government	Gas pipeline and LNG facility
Development approval for operational works within a coastal management district	<i>Coastal Protection and Management Act 1995</i> SPA	DERM	Gas pipeline and LNG facility
Approval for the removal or placement of quarry material below high water mark	<i>Coastal Protection and Management Act 1995</i> SPA	DERM	Gas pipeline and LNG facility
Development approval for operational works for taking or interfering with water	<i>Water Act 2000</i> SPA	DERM	Gas fields, gas pipeline and LNG facility
Approval to damage vegetation on State coastal land	<i>Coastal Protection and Management Act 1995</i>	DERM	Gas pipeline and LNG facility



Project approval	Legislation	Government agency	Relevant project area
Beneficial reuse approval for associated water	EP Act Environmental Protection (Waste Management) Regulation 2000	DERM	Gas fields
Licence for taking or interfering with water	<i>Water Act 2000</i>	DERM	Gas fields and gas pipeline
Riverine protection permit	<i>Water Act 2000</i>	DERM	Gas fields and gas pipeline
Registration as a water service provider	<i>Water Supply (Safety and Reliability) Act 2008</i>	DERM	Gas fields
Permit to interfere with forestry products	<i>Forestry Act 1959</i>	DERM	Gas fields and gas pipeline
Development permit for interference with native vegetation, protected	<i>Nature Conservation Act 1992</i>	DERM	Gas fields, gas pipeline and LNG facility



5. Key findings and environmental management plans

5.1. Key findings

The APLNG EIS and supplementary studies and reports identified the following key findings:

- The development of the gas field will necessitate the placement of many noise sources in a rural setting. Investigations into potential noise mitigation measures and their usefulness have been undertaken. These investigations have influenced the project design in terms of choice of development approach. This approach has been established to protect community environmental amenity. Regulatory guidelines will be developed and complied with.
- As a result of treating associated water, salt is produced. It is likely that more than 438,000 tonnes of salt⁴ will be produced in the first 5 years of operation. Over the 30 year life of the project, approximately 2,000,000 tonnes of salt will be produced. APLNG is seeking to identify commercial opportunities to disposal of the salt. Alternatively, the salt must be disposed of to regulated landfill. The location and capacity of suitable disposal sites must be defined prior to EA approval.
- The proponent has developed a strategy for beneficial use of permeate from the three Water Treatment Facilities (WTF) operated in the initial 5 years. APLNG has prepared an assimilation model for pulsed release of water to the Condamine River, downstream of the Chinchilla Weir as a preferred model for permeates management. Other disposal options are being investigated including aquifer injection, agricultural and commercial uses.
- A key consideration of the proposal is the extraction of CSG water and the implications that this could have on existing land use and the environment. The EIS and supplementary studies presented a concise summary of land use and water uses in the proposed gas field development area, as well as groundwater recharge areas and discharge springs.
- The review (and assessment) has adequately qualified the CSG water draw down effects on both the aquifer systems above and below the Walloon Coal Measures and developed a workable safeguard arrangement to respond to any un-planned adverse effect.
- The initial 5 years of the project gas field development is likely to cause limited impact on current land use and infrastructure, particularly cropping lands and state forests, due to the dispersed nature and multiple locations of the Gas Field wells and associated infrastructure.
- While a negligible impact on shallow aquifers is predicted, extraction of CSG water could adversely affect existing production bores sunk in deeper aquifers that are used for stock watering. Regulatory measures have been developed for dealing with this issue.
- A risk-based approach to land contamination that considers the most likely contaminants and their likely locations has been adopted. At this stage no potentially contaminated areas have been located. Any potentially contaminated sites will be identified and appropriately managed as gas fields are developed.
- Dredging impacts will be limited to the immediate area of the dredging operation and will be conducted by Gladstone Ports Corporation on behalf of APLNG in a manner similar to that applicable to other dredging activities in Port Curtis for the Western Basin Dredging and Disposal Project.
- Offsets will be offered for flora and fauna disturbance in accordance with State and Commonwealth policies.
- The assessment of the project in both the EIS and supplementary information concluded that the project will have minor to moderate impacts which can be mitigated through design and management and through appropriate conditioning and monitoring by government agencies.

⁴ Assumes: CSG water volume = 120 ML/d average for the first 5 years, 80 ML/d long-term average
Average salinity = 4,000 mg/L
Water treatment reduces salinity by 90 per cent



5.2. Environmental management plans

The EIS provided a draft Environmental Management Plan (EM Plan) for each of the gas fields, the pipeline and the Curtis Island LNG facility covering construction, operation, decommissioning and rehabilitation. The final EM Plan will be lodged with DERM as supporting documentation to the EA applications in accordance with section 310D of the EP Act.

The EM Plan has been designed to be read as a stand-alone document and in doing so:

- summarises the management strategies identified in the EIS
- details the proposed performance criteria and implementation strategies to prevent or minimise environmental impacts
- provides government authorities and stakeholders with commitments for environmental management. These commitments are listed in Appendix 6:

Once in place, it is intended that the EM Plan will be a dynamic document. It will be updated to incorporate:

- further information
- changes in environmental management measures further to information that becomes available during detailed design
- changes to legislative requirements.

The proponent has stated that the draft EMP is intended to be integrated into the proponent's Health, Safety and Environmental (HSE) management system, which has the following structure for all aspects of the development, covering the upstream and downstream activities:

- operational policy
- performance criteria
- implementation strategy
- monitoring
- auditing
- reporting
- corrective action.

The proponent's system provides for:

- roles and accountability within the proponent's corporate structure
- cyclical review of the effectiveness of activities when considered against established performance indicators
- methodology for corrective actions and amendment to business planning and operations, where required
- an over-arching system consistent with ISO 14001 Environmental Management System that is adaptive capable of adapting to the planning, design, construction and operational management needs of the development over the life of the project.

The information presented in the EIS and subsequently provided in response to submissions, is in many respects an overview of what can be expected in a "worst case scenario". Site plans are indicative with higher level of details provided for the initial "five year plan". Further site details will become available when the proponent implements the constraint planning strategy (see section 7.1.4) involving ground-truthing of the information derived from the desk top and preliminary field scouting assessments.

Some of the work already undertaken has improved the focus for developments such as pipe lay-down areas and temporary accommodation camps, but micro-level decisions on siting of wells, access tracks and collection pipelines will be taken in implementation of the constraints planning strategy.

The information provided on this basis is a framework sufficient for consideration of the first 5 years of development and operations in the gas fields, as well as covering the major infrastructure such as the pipeline and the operational trains that will be largely unchanged over the 30+ year life of the project.

For this reason it is essential that the proponent adopts an effective, over-arching management structure that is inclusive of all the decision-making elements dealt with in the first five years of development and be capable of adaptation to accommodate new information.



Based on the information provided in the EIS, in submissions on the EIS and in supplementary documentation, it is accepted that the proponent is in a position to fully assess the environmental social and economic impacts associated with the full extent and life of the project, provided that the management and decision-making structure suggested above is established for the life of the project.

The proponent's constraint planning strategy is considered acceptable, as an appropriate tool for environmental management for the following reasons:

- The scale of the development: 10,000 CSG wells spread over 570,000 ha in a 30 year timeframe, is such that an adaptive management system appears to be a feasible approach to changing circumstances of information and expectations.
- Lessons learned during project implementation need to be incorporated into the proponent's business plan.
- Significant cumulative issues may not be apparent for some time.
- Safeguards and offsets will need time to test their effectiveness.
- Emerging issues including technology development may need to be adopted to keep pace with industry opportunities.
- Constraints identified in the early years of the project may not be relevant in later development areas of the project due to marked differences in topography, hydrology and environmental values.

In order to assert continuity in regulation of the development it would be preferable for the proponent to adopt a management structure that is both knowledge-based and responsive to changing environmental conditions. The constraint planning strategy must be incorporated into a broader environmental management system framework.

Also, it has been noted that the EIS stated that the proponent's health, safety and environment management system (HSEMS) has been developed within a framework consistent with the Australian/New Zealand Standard ISO 14001 Environmental Management System⁵.

The proponent is encouraged to extend the HSEMS to fully integrate management of the proposal in accordance with ISO 14001 and thereby provide a framework that will accommodate the following management aspects:

- Continuous improvement (adaptive management)
- Compliance with environmental and other legislation regulating resource management, social impacts, environmental harm and nuisance (including policy reforms) both now and as legislation is reviewed
- Planning and development of the complete project over the remaining period of development and assessment of site rehabilitation
- Assessment of the ecological disturbance that the project is likely to cause on the status of each class of biodiversity, together with strategic adaptive opportunities to learn from the development experiences and provide feedback to assist future field development planning
- Social impact assessment and management
- Independent auditing and performance evaluation

There are a number of ways in which introduction of such an ISO14001-based system could be contemplated:

- Defining particular areas of this CSG/LNG project where an ISO 14001-based system can be introduced, and setting criteria to be managed. (such as for gas field planning)
- Allowing the proponent to develop an ISO14001-based system in parallel to the traditional Environmental Authority conditions set by DERM, with a reporting mechanism on the performance of the ISO14001-based system; and/or
- Structuring an area of the *Environmental Protection Act* to allow, as an alternative for defined activities, an ISO14001-based system in place of traditional EA conditions.

Further, the EIS has provided specification of the main tool under development for environmental management, the EM Plan. This will address the environmental aspects associated set out in sections 5.2.1, 5.2.2 and 5.2.3 below.

⁵ EIS Volume 2 Chapter 24 Section 24.3



The EIS indicated the proponent's intention to "internalise" the controls, compliance and continuous improvement that would otherwise be provided by reassessment and reconditioning, by the administering authority, of periodic operational plans submitted to DERM, as well as complaints driven reactive compliance actions by regulatory agencies involved.

5.2.1. Gas field EM plan

Management measures have been developed for the following elements which have been addressed in terms of performance criteria, implementation strategies, monitoring, auditing, reporting, and corrective actions:

- land management
- terrestrial ecology
- aquatic ecology
- ground water
- surface water
- associated water
- air quality
- greenhouse gases
- noise and vibration
- waste
- traffic and transport
- Indigenous cultural heritage
- Non-Indigenous cultural heritage
- social impact management plan
- hazard and risk management
- decommissioning and rehabilitation.

5.2.2. Gas transmission pipeline EM plan

The draft EM Plan for the pipeline component of the project has been similarly developed incorporating management measures for the following elements which have been addressed in terms of performance criteria, implementation strategies, monitoring, auditing, reporting, and corrective actions:

- land management
- terrestrial ecology
- aquatic ecology
- marine ecology
- water resources
- coastal environment
- air quality
- greenhouse gases
- noise and vibration
- waste management
- traffic and transport
- Indigenous cultural heritage
- Non-Indigenous cultural heritage
- social impact management plan
- hazard and risk management
- decommissioning and rehabilitation.

5.2.3. LNG facility EM plan

The draft EM Plan for the LNG facility has been developed incorporating management measures for the following elements which have been addressed in terms of performance criteria, implementation strategies and monitoring, auditing, reporting, and corrective actions:

- land management
- terrestrial ecology



- aquatic ecology
- marine ecology
- surface water
- groundwater
- coastal environment
- air quality
- greenhouse gases
- noise and vibration
- waste management
- traffic and transport
- Indigenous cultural heritage
- shared cultural heritage
- safety
- decommissioning
- social impact management plan.



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.

Pipe transport task

The EIS, and in particular, Volume 3, Chapter 17 outlined that there will be a gas pipeline extending approximately 450 km, from the LNG facility on Curtis Island to Miles.

The pipe is made up of 1067 mm, 914 mm and 76 mm diameter sections, constructed in maximum 18m segments. Transporting pipe segments from the port to laydown yards and coating facilities may begin in the first half of 2011 and continue for approximately 12 months. Pipe segments will be transported from Auckland Point in Gladstone or the Port of Brisbane to coating facilities located along the pipeline route. After coating, the pipe segments will be transported to laydown yards before final placement in the gas pipeline right of way.

The main traffic generated by gas pipeline construction is the transport of pipe segments. If the pipeline is to be moved by road transport then a 25m extendable semi-trailer may be used to transport the 18m long segments. Each load would contain two pipe segments of the 1067 mm and 914 mm diameters and three pipe segments of the 76 mm diameter. To transport the pipe, a total of 11,900 truck loads may be required for a 9 to 12 month period, with an average daily traffic volume of 32 truck loads (65 trips daily) during that time.

The EIS also raised an option to transport by rail and if this mode of transport is undertaken then the pipe segments may have to be transported to laydown points at Miles and Moura, and then moved by road to their destinations. This may require construction of rail sidings and support facilities at these destinations. A preliminary assessment of these locations has indicated that this is feasible although additional infrastructure may be required. In addition, alterations of existing facilities may be required at Auckland Point and the Port of Brisbane.

The EIS outlined how the option to utilise rail is being further investigated in consultation with QR, and that recent indications from QR are positive, and there may be opportunities to provide rolling stock and appropriate ancillary services to allow transport of the pipe by rail. However, in the EIS, APLNG assumed that all pipes will be transported by road from Gladstone and Brisbane ports. This provides a 'worst case' assessment for road impacts.

Rail transport from Gladstone requires the integration of port facilities and rail capabilities.

The EIS stated that a port survey is currently underway, and this will provide detailed information on the port's handling capacity. Additional handling opportunities or constraints may arise from the survey. If rail transport is utilised, the following modifications to Queensland Rail infrastructure may be required:

- additional sidings may be required
- currently, it is reported that there is a locomotive and wagon shortage in Queensland and additional locomotives and wagons may be required
- initial logistic calculations suggest that an additional port laydown area may be required to enable vessels to unload at normal port rate, and not be delayed by the rail option
- the missing southern rail link between Theodore and Wandoan and other planned lines, if operational, would make the rail option more attractive
- the length of the project's pipe (18m) may be an issue, with limitations on weight and length on existing wagons and rail lines being exceeded in some cases. Eighteen metre wagons exist but are scarce and the quantities required for the project may exceed the current available wagons.



The EIS concluded that the decision on road versus rail transport or a combination of both can only be made when the discussions with QR are complete.

During August 2010 APLNG submitted two supplemental information papers, one titled Traffic and Transport, assessment of pipeline transportation by rail, and the other titled Project Description Improvements. As discussed above Volume 3 Chapter 17 of the EIS presented road transport as the base case for the movement of pipe with the option to use rail being under investigation. These supplemental papers outlined that APLNG have had further discussions with Queensland Rail, along with investigations into engineering and feasibility, which indicated that rail is feasible and is APLNG's preferred option as it will reduce the potential for traffic impacts in Gladstone.

It is now planned that gas pipeline will be delivered exclusively via Auckland Point at Gladstone Port from late 2011 at a rate of one shipment per month. It is estimated that the pipeline will comprise of:

- 380 km at 1067 mm diameter
- 81 km at 914 mm diameter
- 96 km at 76 mm diameter.

All the pipes will now be pre-coated prior to importation.

Approximately 60 km of 1067 mm pipe will be transported by road to a laydown area near Mount Larcom while the remainder will be loaded onto trains and delivered to the proposed Biloela support base via a railhead at Biloela. It is anticipated that one train per day for 12 months will be required. The pipe will then be transported from the Biloela support base to pipe stockpiles at approximately 100 km intervals along the pipeline using extendable semi trailers. The pipe will then be transported to the Right of Way.

APLNG has completed an updated traffic and transport assessment incorporating the rail option to assess the sensitivity from the model output. APLNG is also committed to working with DIP and DTMR on the cumulative transport study, which has been commissioned (see below). In addition, APLNG has commissioned engineering firm KBR to undertake dynamic simulation modelling to support logistics planning for the construction of the main APLNG pipeline.

The objectives of this report are:

- clarify any assumptions made in the WorleyParsons' traffic and transport model, particularly if the assumptions are relevant to the logistics planning process
- identify any impacts on the transport network resulting from the aforementioned changes in the project including any reduction in traffic flows along roads previously used by project vehicles transporting pipes
- the investigation is to identify potential hazards in the network resulting from the abovementioned changes that may require further analysis or investigation
- identify roads that are crossed by the current proposed pipe alignment and roads which may be utilised by pipeline construction traffic.

Pipes will be supplied in either 18 m (triple random) lengths or 12 m (double random lengths). Pipe segments transported by road are proposed to utilise a 25 m extendable semi-trailer to transport the 18 m long segments. Each load would contain two pipe segments of the 1067 mm and 914 mm diameter pipes and three pipe segments of the 74 mm diameter pipes. Shorter pipe segments may use an alternative vehicle however the same load configuration has been assumed.

This traffic and transport supplementary report concludes that the project changes associated with the pipeline construction, namely the transport of the majority of the pipe segments by rail from Auckland Point to Biloela, has resulted in an overall reduction in road based trips. In particular there has been a significant reduction in the number and duration of heavy vehicle movements associated with the transport of pipe segments in Gladstone. This reduction in heavy vehicles movements in Gladstone is expected to result in:

- improved road safety
- reduced road congestion
- reduced environmental and social impacts.



Whilst the changes have increased impacts on sections of the road network within the pipeline study area outside of Gladstone, it is anticipated that these impacts will not be significant and will be able to be mitigated.

Stakeholder issues

The EIS determined that the traffic generated from gas pipeline construction does not bring forward the need to alter any state controlled roads links within the gas pipeline study area. There may be some impact on the local road network but the impacts are expected to be minor. In their submission to the Department GRC supports the proposal to transport pipe by rail. DTMR also advised that appropriate interface agreements must be arranged with the railway manager before any private sidings can be constructed off active railway corridors. DERM also requested that more detail needs to be supplied regarding the construction and location of any lay-down areas and temporary camps during construction of the pipeline.

Proponent's response

As discussed above, APLNG advised that they now plan to use rail out of Gladstone to Biloela. At the time of writing this report it is not clear that any firm contracts have been entered into with QR or any other rail provider.

Coordinator-General's conclusion

It is acceptable that the final arrangements to transport pipe to the pipeline corridor be resolved subsequent to the EIS process during the detailed design phase of the project. However, issues about the impacts on roads and also on the Gladstone community also need to be addressed. Therefore a conditions have been set regarding arrangements for use of rail for pipes that are brought in via Gladstone. These conditions are brought to the attention of relevant agencies (DTMR, Gladstone Ports Corporation (GPC) and GRC) responsible for any subsequent approvals required for pipe transport. These conditions appear in Appendix 1 Part 2.

The proponent is required to commit to all but 60 km of pipe to be transported by rail, as it indicated in the supplemental information submitted in August 2010. This is conditioned in Appendix 1, Part 2, Condition 1.

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

6.1.2. Material and personnel transport

Operational transport (LNG facility)

As described in Volume 4 Chapter 17 of the EIS staff will commute daily from the Gladstone area to the LNG facility on Curtis Island. It was assumed, for the study that these workers will drive by private vehicle (1.2 persons per car) to Fishermans Landing northern expansion before boarding a barge/ferry for the journey to Curtis Island. For Train 1 operations it was assumed that there would be 100 staff per shift; two shifts working 24hrs/day, seven days per week.

Logistics vessels used during normal operations will include a water taxi at shift start and end, plus additional movement of personnel, as required throughout the day, including ferries carrying waste and supplies and waste to and from site. Water taxis and ferries used for the project's operations phase will be high speed, have a low draught and be highly manoeuvrable. These vessels, despite the anticipated number of daily movements, are anticipated to be able to operate without appreciable impact on bulk shipping operations or recreational users of the waterways.

LNG will be exported by specially-designed ships from the LNG facility on Curtis Island and exit through the GBRMP. LNG ships will represent an approximate increase of three per cent in current shipping movements through the GBRMP for the first LNG train. This may increase to 13 per cent once the four LNG trains are operational. All ship movement through the GBRMP will be in accordance with all international and national shipping regulations.



The EIS explained that a model simulating Gladstone's shipping operations was undertaken in 2009. This assessed the traffic flow within the Gladstone Harbour and included a number of LNG cumulative projects. The report concluded that using improved management logic, only a marginal decrease in average port performance (with the introduction of LNG trades), is expected.

Construction transport (LNG facility)

In the EIS it was estimated the construction workforce requirements will peak at approximately 3300 workers during the construction of Trains 1 and 2 and during construction of Trains 3 and 4. It was been assumed that up to 80 per cent of the total workforce will be accommodated on Curtis Island in a TWAF and will work four weeks on and one week off. These workers living in the TWAF will be non-residents and will either fly in/fly out (FIFO) from Gladstone airport or drive in/drive out (DIDO) from outside the local area (local area being defined as within 60 km of the Gladstone Post Office). The FIFO workers will be shuttled to/from the airport on buses. DIDO workers will park their cars in the designated secure car park area during their rotation in the construction camp. The remaining 20 per cent or more of the workforce are assumed to be residents of the Gladstone area and will commute by private vehicle to a secure car-park, park their vehicles and then will be bussed to the Fishermans Landing north expansion ferry terminal. From here these workers will be transported by ferry to Curtis Island. During August 2010 APLNG submitted a paper outlining project description improvements and in this advised that they have selected a proposed site on Bensted Road that will be developed for car parking facilities, a bus terminal to transport personnel to the mainland marine facilities at Fishermans Landing, operations offices and training and hiring facilities.

Shipping activities associated with construction of the LNG facility relate to:

- transfer of personnel and equipment between Gladstone and the LNG facility site; staging to occur from ferry embarkation point (Fishermans Landing northern expansion) by barge and ferry
- delivery of plant, materials and equipment to the LNG facility site on Curtis Island directly via the MOF and temporary rock dock on Curtis Island.

The EIS alluded to a permanent facility on the mainland may be established to provide for barge and ferry transport. A ferry dock will be constructed on Curtis Island to receive construction and operational personnel. A materials staging area on the western side of the harbour at Gladstone would also need to be established to facilitate the transport of materials and personnel. Such a wharf facility should include car parking and waiting areas. Fishermans Landing has been assumed as the site for this facility. The transport of heavy loads of construction equipment and consumables to the site will be undertaken by barge.

For the very early part of the construction phase, clean treated water will be brought to the site in tankers from Gladstone on barges. Approximately 800,000 m³ of fresh water will be needed on Curtis Island. A temporary seawater desalination plant will be installed as soon as practical to meet ongoing fresh water needs during construction. The Gladstone and Area Water Board and GRC are looking at the feasibility of reticulated supplies onto the island.

Fishermans Landing will act as the embarkation point for materials to the LNG facility. The MOF will then allow direct shipment of some facility modules and other materials to the Curtis Island site. Construction shipping will include up to approximately 140 ferry journeys per month (between Fishermans Landing and Curtis Island) and approximately 70 barge journeys per month during the peak construction period. Given that in 2008 a total of 1,417 cargo vessels (excluding pleasure craft) transited Gladstone Harbour, this represents a significant increase in the number of vessel movements. However, the EIS concluded that the overall impact on non-project shipping and boating activities is anticipated to be minimal as the ferries proposed to be used are highly manoeuvrable and can navigate around any large slow moving bulk carriers.

Stakeholder's issues

Agencies and other stakeholders, such as the local fishing industry, have raised issues about the increase in shipping movements within the Gladstone Harbour during the APLNG construction phase. Car parking and increased traffic volumes are also of concern.



Transport impacts on the foreshore of the Gladstone area to cater for the movement of the workforce were raised by the Gladstone Yacht Club and the Port Curtis Sailing Club Inc.

DTMR suggested that the proponent should consider the benefits of shared ferry transfers and infrastructure with other LNG proponents. The cumulative impact of all proponents providing ferry movements to support the LNG operation has the potential to significantly increase vessel traffic movements in the Gladstone Harbour area, which increases the risk of a marine incident. The department also requested more information be supplied about the design of facilities adjacent to Gladstone Harbour. There is potential also for ferry traffic to cause unacceptable shoreline erosion unless hull design measures are adopted.

Coordinator-General's conclusion

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.

Some of the above plans to use facilities within the Port of Gladstone may not be possible as there could be significant capacity 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. It is noted also 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, a series of conditions for the APLNG project have been set which revolve around 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 of port and road facilities. These appear in Appendix 1 Part 2 as Conditions 3 to 6.

In regard to potential shoreline erosion from ferry wakes, a condition has been specified requiring low-wake impact ferry design and operations to be adopted. This appears as Appendix 1, Part 2, Condition 7.

The proponent is also required to prepare and submit for the approval of Maritime Safety Queensland and the Regional Harbour Master (Gladstone), a Marine Traffic Management Plan and a Harbour 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, Condition 6, parts 1 and 2.

Recommendation 1

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

Recommendation 2

It is recommended that the proponent discuss their plans for workforce transport to and from Curtis Island with the Gladstone Yacht Club and the Port Curtis Sailing Club Inc.

6.1.3. Roads impacted by APLNG

In Volumes 2, 3 and 4 Chapter 17 the EIS addresses the road impacts. The technical report in Volume 5 Attachment 35 underpins the outcomes summarised in the EIS.



The Project consists of three integrated components:

- gas fields—further development and expansion of the coal seam gas (CSG) fields to the north- west and south-east of the existing Walloon gas fields' development area centred on Miles
- gas pipeline —construction of a gas pipeline between the gas fields and the LNG Plant on Curtis Island, Gladstone
- LNG facility, Curtis Island Gladstone—staged construction of a liquefied natural gas (LNG) plant and associated facilities at Curtis Island off Gladstone to export LNG to international markets.

Both State-controlled roads and Local Government roads were included in the assessment. State-controlled roads that were assessed included main roads generally from Gladstone to the north, to Roma to the south west, Dalby to the south east and Miles to the south with the Dawson Highway, Leichhardt Highway, Warrego Highway and Jackson-Wondoan Road being key access routes. Local Government roads such as Crossroads Road, Horse Creek Road and Yuleba Taroom Road provide access to the CSG fields while roads such as The Narrows Road, Welsh's Road and L Tree Creek Road provide access for the construction of the gas pipeline. Road access to the LNG facility utilises roads within Gladstone such as the Dawson Highway, the Gladstone-Mt Larcom Road and Landing Road. Materials, machinery and personnel are proposed to be transported to Curtis Island through Fishermans Landing.

Gas fields

In the gas fields a number of key state-controlled roads within the study area may be impacted by project traffic. The roads are listed and described in the EIS at Table 17.6 of Volume 2 Chapter 17. These roads will carry construction and/or operational traffic throughout the life of the project.

In the EIS APLNG advised that all construction staff movements may be as follows:

- eighty per cent by buses with a 20-passenger capacity
- twenty per cent by low occupancy vehicles consisting of three to seven seats with an average of 1.2 people per vehicle.

Table 17.10 in the EIS identified the construction workforce adopted in the transport modelling for each gas processing facility.

In addition to the personnel movements, traffic movements will also include delivery of construction materials and plant. While there is a preference for local and regional sourcing, it was assumed that construction machinery and temporary accommodation facilities would most likely be sourced from Brisbane. Other materials and consumables are generally supplied from the distribution centres in Miles and Roma, including a portion of the total water requirement. A summary of the significant construction materials for the gas fields' infrastructure can be found in the EIS at Table 17.11. Most of the traffic will be heavy vehicles. There will be a number of deliveries in the operations phase of the project for each project component. Table 17.12 provides a summary of the anticipated delivery schedules during operation.

The EIS states that the gas fields' development traffic does not bring forward the need to alter any of the state-controlled road links within the gas fields' study area by more than one year. This includes both the APLNG gas fields' construction and the cumulative impact of other regionally-significant projects. The road links within the study area used by the project traffic will operate with a level of service C or better, which is considered satisfactory. The EIS does conclude that traffic associated with the gas fields' construction and operation will impact on some of the local roads within the gas fields' study area. For each local road, the average and peak daily project traffic has been determined and used to assess impacts. The impact on local roads is given in Table 17.16 and Table 17.17 Volume 2 of the EIS.

Although traffic count data for the council roads identified is not available it is expected that these roads would on average carry less than 150 vehicles per day.

The traffic associated with gas fields' construction will generate maximum peak hour traffic of 173 trips throughout the network. This low level of traffic generation is unlikely to impact on intersection operations within the gas fields' study area. The EIS concluded that the project traffic and cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersections, and the intersections will operate within capacity for the full planning horizon.



Intersections of state-controlled roads with council-controlled roads, used by the project for construction of the gas fields, will be impacted by increased turning movements. There may be warrants for alterations due to this increased turning traffic. During gas fields' construction, oversized and/or overweight vehicles may need to travel along state-controlled roads and, in some cases, along council-controlled roads. The EIS stated that it is anticipated that detailed negotiations will be held with the relevant authority with respect to appropriate mitigation strategies for the local road network.

The EIS also indicated that generally, insufficient information was available from the regionally significant projects included in this report to enable a cumulative assessment of the local roads network. While details of the roads to be used by other projects were given in some of the other environmental impact statements, either the roads to be utilised by others were different, or the timing of the use of the road by others was different to the timing proposed for the project.

In their EIS APLNG stated they will work with the federal, Queensland and local governments and industry regarding the potential alterations, monitoring and maintenance required to meet the increased demands on local infrastructure. The project will aim to reduce private vehicle use as much as possible during construction, by providing transport to site, from designated pick up areas or to and from the local airport for fly-in/fly-out staff. Journey management plans for vehicle travel will incorporate fatigue management considerations.

Gas pipeline

In the EIS the proponent outlines how a portion of construction staff will use temporary accommodation facilities located along the pipeline route. On average, 600 people are expected to reside in the main temporary accommodation facility, working 12-hour shifts for four weeks on and nine days off. In addition to the main construction crew, there will be specialist crews of up to 200 people working elsewhere and they will reside in separate temporary accommodation facilities or local accommodation. Overall, it is assumed that 10 per cent of the staff will travel by vehicle to site, with 90 per cent being transferred by bus. After working the four week roster, non-local staff will be transported by bus to the nearest airport for flights to their usual place of residence. The airports used for the staff rotations are proposed to be Gladstone, Miles and Biloela.

The main traffic generated by gas pipeline construction is the transport of pipe segments. It is preferable that the right of way be accessed at 10 km intervals via the local road network. The EIS again concluded that the traffic generated from gas pipeline construction does not bring forward the need to alter any state-controlled road links within the gas pipeline study area. This includes both the APLNG gas pipeline construction and the cumulative impact of other regionally-significant projects. Within the gas pipeline study area, the road links that project traffic uses will operate with a level of service of C or better during the construction period. This is considered satisfactory.

The EIS did conclude that the gas pipeline construction may impact on the local road network within the gas pipeline study area. For each local road, the average and peak daily project traffic for pipeline construction was determined and used to assess impacts. The impact on local roads is provided in Table 17.13, Table 17.14 and Table 17.15, of Volume 3.

Although traffic count data for the council roads identified below is not available it is expected that these roads would on average carry less than 150 vehicles per day. The gas pipeline traffic impacts a number of council-controlled roads, and the nature, magnitude and significance of this impact was addressed in Section 17.3.1. Appropriate measures for impact mitigation have been identified which aim to reduce any negative impacts and maximise the positive benefits for adjacent land owners and road users.



Where the project traffic is associated only with the construction of a pipeline including access to camps, the project traffic will be of a low level (less than 150 vehicles per day) and should occur over a short duration of two to three months. Depending on traffic volume and load type for local roads impacted APLNG propose to alter the local road to a minimum unsealed six metre formation. This will enable two heavy vehicles to pass safely. Where the peak daily project traffic is above 150 vehicles per day the formation width may be increased to eight metres. The alteration may involve re-sheeting of the existing gravel pavement to provide a pavement of suitable strength to cater for the increased heavy vehicle traffic generated by the project. During construction more regular maintenance of the road should be undertaken including regular grading and dust control in accordance with an approved traffic management plan and where required to maintain safety. In their EIS APLNG anticipates that detailed negotiation will be held with the relevant authority with respect to the appropriate mitigation strategies for the local road network.

Generally, insufficient information was available from the regionally significant projects included in the EIS to enable a cumulative assessment of the local roads network. While details of the roads to be utilised by other projects were given in some of the other environmental impact statements, either the roads to be utilised by others were different or the timing of the use of the road by others was different to the timing proposed for the project.

APLNG will aim to reduce private vehicle use as much as possible during construction, by providing transport to site, from designated pick up areas or to and from the local airport for fly in/out staff. Journey management plans for vehicle travel will incorporate fatigue management considerations. Construction and ongoing service deliveries to project facilities will be in accordance with a safe travel transport management strategy and relevant transport regulations. This will include strict adherence to driver travel and required rest periods and the adoption of safe driving techniques.

The EIS also outlined how a number of temporary accommodation facility roads and local roads associated with the construction of the gas pipeline will access directly onto state-controlled roads. The final locations of the new intersections will be selected to ensure that safe intersection sight distance is achieved for the speed environment on the state-controlled road. It is expected, based on the turning volumes in/out of the camps and facilities that the new and existing intersection forms are likely to be a minimum basic right turn and basic left turn treatment. This will be assessed as part of the traffic management plan. Accesses to temporary facilities lay down areas and stockpile sites that have been constructed as part of the project will be decommissioned unless relevant federal, Queensland or local authorities or landowners agree to leave them in place. New roads will need to be constructed to access gas pipeline infrastructure. In determining the location of these facilities, consideration has been given to the proximity of existing roads and the local environment.

To reduce the risk of accidents to employees and other transport network users from project operations, APLNG will develop and implement detailed traffic management plans and transport and logistics management plans for constructing and operating the gas pipeline. These plans will incorporate safety measures to be implemented across all relevant modes of transport.

LNG facility

The EIS indicated that there are potential impacts from the project to the road network with the most significant impact to road intersections as identified in section 17.5.1 and 17.6.1, Volume 4 Chapter 17. The EIS stated that the LNG facility's traffic does not bring forward the need for alteration of any of the State controlled links within the study area by more than one year and as such there are no alterations required.

A number of State controlled intersections within the Gladstone area have been identified as requiring an alteration to mitigate the impacts of the project's traffic and cumulative traffic from the other regionally significant projects. Table 17.14 of the EIS provides a summary of the proposed alterations to State controlled intersections within the study area and identifies alteration works.

The EIS also stated that no oversized road based trips are envisaged. However, any oversized and/or overweight vehicle movements will be undertaken in accordance with State regulations and the *Transport Infrastructure Act 1994*. Traffic management plans will be in accordance with these regulations.



The EIS outlined that for all road-based construction activity associated with the project, a traffic management plan during the front end engineering and design (FEED) stage of the project will be developed. The plan will be developed in conjunction with the relevant state and local authorities and the local community. With regard to the movement of heavy vehicles associated with the development throughout the road network the traffic management plan will address:

- Routes to be used by the heavy vehicles, with routes generally restricted to existing heavy haul routes, particularly through the Gladstone region
- Restriction of heavy vehicle movements during certain time of day/week, e.g. on routes which traverse school zones
- Restriction of vehicle speeds near residences
- Possible installation of temporary/permanent signage to warn road users of increased heavy vehicle activity.

Stakeholder issues

Banana Shire raised issues about the capacity of the existing road infrastructure to cater for the expected increased volume of construction traffic. Damage to the road network is already being experienced due to construction traffic for similar projects. They also are wanting to avoid ratepayers having to pay for any rehabilitation costs. The increase in traffic volumes may also introduce public impacts for noise, dust and other environmental and amenity issues along roadways.

Likewise Western Downs Regional Council also raised issues about the increase in the volume of traffic. They advised that the increase in heavy vehicle and associated general traffic to access projects has placed an unsustainable burden on the local road network, increasing the maintenance costs and the frequency rates that WDRC have to carry out its road maintenance programs. They require that a comprehensive Traffic Impact study be undertaken, a TMP be submitted for approval, the development of mitigation measures that will minimise the impact on council roads, that APLNG enter into an Infrastructure Agreement and to that end they require a two asset condition assessments be carried out—one prior to any construction traffic using council roads and the second at the completion of the project to determine whether any additional maintenance is required to restore the road networks to original condition.

Maranoa Regional Council also requests that APLNG enter into an Infrastructure Agreement to ensure that the proponent contributes to the cost of maintaining and upgrading of community assets.

Toowoomba Regional Council request that they be involved in the preparation of any transport logistics management plan to ensure vehicle movements related to the APLNG project through Toowoomba City are managed and avoid significant impacts on traffic congestion and amenity.

Gladstone Regional Council referred to the EIS and noted that it concluded that pavement impacts on local roads could not be performed because of lack of condition data and historic deterioration rates on these roads. Council requested APLNG to perform a pavement impact assessment using the methodology detailed in an attachment to their submission. They also identified risks about trucks carrying pipes turning at some intersections. These intersections are suitable for B Double movements however 18 m long pipes transported on “extended body” trucks will require much bigger turning radii than standard trucks.

The QPS submitted that the proponent should develop and implement detailed traffic movement plans and transport logistics management plans to reduce the impact of traffic and transport on communities, and the QPS must be consulted on the development of these plans.

DTMR has raised issues about the list of intersections affected by project traffic. They need more information on what level of improvement is potentially required. DTMR also submitted that for the gas fields in Volume 2 Chapter 17 Table 17.24 lists roads where pavement loadings measured in equivalent standard axles (ESA's) are greater than 5 per cent, however, the percentage increase in ESA's is not shown. DTMR also identified that the proponent has not adequately assessed the cumulative impacts of the LNG plant and pipeline for the construction and operational phases on the state-controlled road network and its infrastructure. Mitigation measures in some cases have not been addressed and a “statement of commitments” needs to be developed.



DERM has indicated that construction of approximately 6500 km of roads and access tracks in the gas fields 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 supplementary information, nor do the proposed mitigation measures reflect the extent of the potential impact.

Proponent's response

In response to the DTMR issue on ESA's APLNG confirmed that the EIS study was based on a standard industry pavement assessment methodology as presented to DTMR prior to the release of the EIS. This methodology incorporates the use of ESA's as a way of determining pavement impacts. Percentage increases varied across road segments. APLNG will provide this information to DTMR as requested.

APLNG have also confirmed that a road use management plan will; be developed in consultation with DTMR regional offices.

In supplemental information supplied in August 2001 APLNG confirmed that they will contribute to a Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts. APLNG will use the most current traffic data in its transport impact assessments necessary to inform road use management plans and infrastructure agreements.

Coordinator-General's conclusion

It is considered that APLNG should consult with the DTMR Central District office, for state-controlled roads, and the relevant local government (depending upon location of the works) for local roads, within 3 months of making the financial investment decision to proceed with the project to:

- provide accurate details of intended usage of each road for the haulage of personnel, 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 APLNG
- 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 the commencement of each phase of construction for each component of the APLNG project
- contribute to road infrastructure improvements necessary to alleviate impacts of the project.

In order to ensure that road and traffic impacts are properly managed, conditions and recommendations on the above subjects have been included for the project. These conditions to the attention of the relevant agencies (DTMR, Gladstone Ports Corporation, DIP and all relevant regional councils) responsible for any subsequent approvals. They appear in Appendix 1 Part 2 as Conditions 8, 9, 10 and 11. A requirement has also been specified to prepare a Gas Fields Logistics Plan at Appendix 1, Part 2, Condition 4.

In Condition 14 it is recommended that APLNG work closely with the Officer in Charge, Gladstone District Traffic Branch and other areas of Queensland Police Service (QPS) when developing the Traffic and Transport Management Plans for Gladstone. APLNG should engage with relevant entities early to ensure a capability in policing response to security risks and emergencies. It is noted that the proponent has made a commitment to work closely with QPS to ensure adequate planning and response measures are implemented.

The proponent has not made commitments to provide infrastructure such as marked vehicles needed to supervise the movements of over-dimensional vehicle movements. It is recommended that in discussions with the relevant authorities on over-dimensional vehicle movements the proponent should consider such a commitment to ensure road safety is maintained at all times.

On the matter of the potential impact of approximately 6500 km of roads and access tracks in the gas fields, the proponent's environmental management plans must include mitigation measures associated with tracks and roads. This condition appears in Appendix 1, Part 2, Condition 10.



6.1.4. Air transport

In Volume 5, Attachment 35 of the EIS it was confirmed that three airports and one aerodrome have been identified as possible fly in/fly out locations for construction and operations personnel. These are:

- Gladstone Regional Airport
- Thangool (Biloela) Airport
- Miles Aerodrome
- Roma Airport.

The project's impact on air services was assessed in the EIS by comparing project traffic to airport capacity and current flight schedules. Discussions have been held with the Western Downs Regional Council, Banana Regional Council, Maranoa Regional Council and Gladstone Regional Council about current operations and requirements for any future alterations to airports/aerodromes identified as potentially being impacted by the project.

At Gladstone APLNG assert that they will work with industry to optimise roster timings and reduce daily passenger movement peaks. The cumulative growth plans for the Gladstone region are complemented by the current upgrades being completed at the Gladstone Regional Airport. Flexibility for larger aircraft including jet service as well as more frequent service will afford advantages and opportunities to source resources more efficiently throughout Australia. This combined with increased competition would benefit the projects as well as the community at large.

The Miles Aerodrome is impacted by gas fields and gas pipeline construction and operations personnel during shift changes when personnel are bussed to and from the aerodrome. The current aerodrome may be able to cater for Dash 8-200 aircraft capable of carrying 36 persons. To cater for the pipeline and gas field construction traffic, up to an additional seven Dash 8-200 aircraft movements may be required. Up to four Dash 8-200 aircraft movements may be required from 2014 to 2018 and one to two aircraft movements may be required beyond 2018. From time to time during the operation of the gas processing facility located 2.2km south west of the Miles Aerodrome, exhaust gas plume rises may occur which could possibly impact on aircraft operations. APLNG has undertaken a Process & Exhaust Gas Plume Rise Assessment of this risk and have identified measures to ensure that the safety of aircraft is not compromised. Details are provided in Volumes one to four, Chapter 22 of this EIS.

The Biloela Airport is impacted by the pipeline construction personnel during shift changes when personnel are bussed to and from the airport. The EIS determined that the current airport can cater for Dash 8-200 aircraft capable of carrying 36 persons. Therefore, to cater for the impact of the gas pipeline construction, up to an additional four Dash 8-200 aircraft movements may be required.

The Roma Airport is impacted by gas field construction and operations personnel during shift changes when personnel are bused to and from the airport. The EIS determined that the current airport can cater for Dash 8-300 aircraft capable of carrying 50 persons. Therefore, to cater for the impact of the gas field construction, up to an additional one to two Dash 8-300 aircraft movements may be required up to 2018.

APLNG will work with the Gladstone Regional Council, Western Downs Regional Council, Banana Shire Council, Maranoa Regional Council, QantasLink and relevant government agencies and service providers to determine the most appropriate options for the use of all of these airports. APLNG will also work with Maranoa Regional Council and relevant government agencies and service providers to determine the most appropriate options for the use of Roma Airport and will support any future application by the Maranoa Regional Council for government funding to upgrade the Roma Airport.

Stakeholder issues

Western Downs Regional Council in their submission on the EIS acknowledged their appreciation that the proponent will fully fund the upgrade to Miles aerodrome and will work with WDRC to determine funding levels for the ongoing operational and maintenance costs for the aerodrome, particularly during construction periods.



Maranoa Regional Council in their submission acknowledges that APLNG will work with local governments and industry in regard to infrastructure alterations required to meet increased demands and also APLNG's commitment to support council's application for government funding to upgrade Roma airport. However this commitment does not provide council with certainty and they have requested that APLNG enter into an infrastructure agreement with council to ensure APLNG contributes to the cost of upgrading the Roma airport to a level commensurate with the demand generated by the APLNG project.

Coordinator-General's conclusion

It is considered appropriate for APLNG to make a financial contribution to any airport upgrades which may be required to alleviate the impacts of the fly-in fly-out workforce on the local airports. In order to ensure impacts of the project on airports are adequately managed, APLNG would need to consult and agree with the relevant local governments about the design and timing of any upgrades required and allow enough time to obtain appropriate approvals for the works. A relevant condition is specified in Appendix 1, Part 2, Condition 16.

LNG facility Gladstone

In the EIS, Volume 4, Chapter 13, Section 13.5, APLNG gave details of an assessment of the vertical velocities associated with stack exhaust plumes at the proposed LNG facility that was carried out, based on the guidelines for aviation safety published by the Civil Aviation Safety Authority (CASA) in *Guidelines for conducting plume rise assessments* (CASA 2004).

The aim of the assessment was to investigate the vertical and horizontal extent of the plume from various sources at the facility, and to estimate the height and downwind distance at which the average vertical plume velocities diminish to the critical value of 4.3m/s.

The proposed LNG facility consists of a number of stacks that emit industrial exhausts with the potential to generate significant vertical plume velocities above the LNG facility, as well as potential vertical plumes arising from flaring events. The Gladstone airport is located some 10.3 km to the south of the plant.

In relation to aviation safety, during normal plant operations the following conclusions can be drawn from the assessment:

- there is a potential for the average plume vertical velocity to exceed 4.3m/s up to a maximum height of approximately 850m above ground level at a maximum downwind distance of approximately 166m. The maximum height is dominated by the merged plume from the gas turbine compressors
- the merged plume from the gas turbine compressors is likely to cause the vertical velocity to be greater than 4.3m/s at and above the PANS-OPS (400m) for approximately 28 hours per year or 0.32 per cent of the time
- of all the plumes considered for normal operations, the highest critical height for the 0.1 percentile is approximately 550m above ground level (merged gas turbine compressors).
- during non-routine LNG facility operations an upset event such as flaring may occur.

The EIS concluded that the following conclusions can be drawn from the conservative assessment:

- each LNG production train will have a planned shutdown scheduled to occur several years apart with associated maintenance and start-up flaring.
- a plume from the marine stack flare would have a vertical velocity greater than 4.3 m/s above the height of the PANS-OPS (400m) for approximately 28 hours per year or 0.38 per cent of the time, when assumed operation for every hour of the year.
- the wet or dry gas ground flare, which will typically operate if emergency depressurisation of the plant is required, is likely to generate a plume with vertical velocities above 4.3 m/s well above the PANS-OPS under all conditions.
- an emergency release from the wet or dry gas ground flare is predicted to have a very low frequency of occurrence, with duration of approximately 20 minutes while the plant depressurises, but can potentially occur at any time. Under depressurisation, the ground flare is likely to exceed the PANS-OPS above the site to a considerable vertical distance.



- during commissioning of each train the dry and wet gas flares will be used. The emissions for the flares during commissioning will be less than the worst cases modelled for the non-routine operation scenario, and therefore have not been assessed.

Flaring configuration investigations and optimisation are continuing during the design phase which may incorporate the marine flare within the ground flare enclosure.

In Section 13.6 APLNG outlined mitigation measures to minimise impacts to aviation safety during normal and non-routine operation of the LNG facility. These include:

- provide a ground flare instead of an elevated flare for the main vapour relief system
- continue investigation of incorporating marine flare in the ground flare enclosure
- implement a preventative maintenance program aimed at ensuring equipment is operating efficiently to minimise the need for flaring
- consult with CASA and Gladstone Regional Council airport services to determine an appropriate course of action to manage any potential impact to aviation safety.

Discussions between APLNG, Gladstone Regional Council airport services and CASA will be required to determine an appropriate course of action to manage any potential impacts to aviation safety.

Stakeholder issues

In its submission on the EIS, GRC contends that the EIS did not assess aviation impacts. The EIS presented data on potential flaring and/or plume rise events associated with normal and non-normal operations of the plant. These data sets require further analysis by CASA and Airservices Australia to determine the extent of the consequential aviation impacts. In the interests of aircraft/aviation safety these entities may determine that restrictions must be applied to aircraft operations which could significantly and adversely affect all weather accessibility to Gladstone Airport.

Council expressed a view that it is essential that design/management strategies are agreed and in place prior to approvals being granted so that the precise nature and extent of restrictions to aviation activity are known and fully taken into account in the decision making. GRC are concerned that the use of Gladstone Airport will be significantly restricted in conditions where instrument approaches are required and a number of aircraft will be redirected over residential areas. In addition, aircraft on arrival to Gladstone will be required to fly additional track miles, resulting in added fuel burn and inefficient use of air space. The increased potential for aircraft diversions to Rockhampton will have direct, adverse impacts on aviation business that rely on all weather access to Gladstone Airport. Council supports a whole-of-industry approach to the assessment of cumulative impacts.

Proponent response

In August 2010 APLNG submitted supplemental information to the EIS. In Section 5.1 APLNG outlined how the design of the flare system has been modified from two wet/dry ground flares with a stack marine flare, to a five ground flare system that includes wet/dry and marine flaring. Three of the five ground flares will be constructed during the development of trains 1 and 2, with one of three being a spare. At ultimate development two additional flares will be incorporated in the flare system. The spare unit allows maintenance to occur on the flares without impacting the operation of the plant, thereby increasing plant availability. The revised configuration has the same duty as described in the APLNG Project's EIS, but allows splitting of the flare to multiple smaller units to increase efficiency. The optimised configuration (five ground flare system and the inclusion of the marine flare) has reduced visual impacts to sensitive receptors. It has also reduced heat turbulence at altitude, which reduces potential impacts to aviation safety.

Coordinator-General's conclusion

Given that other LNG facilities are also planned for Curtis Island it is considered appropriate that a cumulative impact assessment on aviation airspace be undertaken. APLNG did not address these concerns satisfactorily in the supplementary information and relevant conditions have been set in Appendix 1, Part 2, Condition 15 and 16.



6.1.5. Cumulative transport impacts

DTMR states that APLNG have not adequately assessed the cumulative impacts of the LNG facility and pipeline for the construction and operational phases on the state-controlled road network and its infrastructure.

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 an array of cumulative impacts for communities and regions, including State and local road networks. Whilst it is considered that APLNG have made a reasonable effort in addressing cumulative impacts, it is acknowledged that proponents can have difficulty in accessing information from competing interests in undertaking cumulative impact assessments. As discussed above, information provided to date does not give 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 deterioration, 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, it is proposed that DIP, in conjunction with DTMR, conduct a "Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts". As a consequence, APLNG has been conditioned to participate in the study by way of Appendix 1, Part 2, Condition 8.

6.2. Social and economic

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

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

- gas fields
- gas pipeline
- liquefied natural gas (LNG) facility.

6.2.1. Social impact

A review of social impacts as presented in the EIS and supplementary information is presented hereunder:

Gas field

The gas field workforce and accommodation requirements in the CSG fields will be substantial. In the EIS, APLNG advised that the project involves the development of approximately up to 10,000 production wells over the life of the 30 year project with about 5,000 wells to be drilled in the first 10 years and a further 5,000 wells to be developed over the remaining period. In August 2010 APLNG re-assessed the number of wells developed in the first 5 years of project development to be typically 150–400 wells per year. Associated infrastructure includes access roads, telecommunications towers, warehouses, administration buildings and temporary accommodation facilities. The gas fields cover the following statistical areas of Chinchilla, Murilla, Tara, Wambo, Bendemere and Millmerran.



The proponent, APLNG intends to house its construction workforce in Temporary Worker Accommodation Facilities (TWAFFs). The workforce numbers for the entire gas fields are likely to be up to 2,100 people in 2013⁶ and the TWAFF will move as new areas are developed and due to the size of the gas fields will need to be located close to the construction site. The temporary construction camps will cater for approximately 600 personnel each. The proponent has stated that there will be seven temporary construction camps in the first 5 years of the project development. Each camp will occupy a footprint area of approximately 1.6 ha and will include individual units, mess halls, recreational facilities, utilities, car parking, sewage treatment plants, administration facilities and waste management areas. The majority of the construction workforce will be accommodated in temporary accommodation facilities and therefore would not be accompanied by their families.

The operational workforce requirements for the gas fields is planned to commence in 2011, with an average of 30 workers required for the first year. Operational workforce requirements will steadily increase between 2011 and 2027, when a total of 690 workers will be eventually required. Between 2011 and 2027, an average of 471 workers will be required. Permanent operations personnel who do not reside in communities close to these developments will be accommodated in facilities sited within a close radius of each group of Gas Processing Facilities (GPFs). These locations will be chosen with consideration given to efficient operational access requirements. However, in situations where developments are close to existing communities, personnel will be encouraged to reside within those communities.

The APLNG draft Social Impact Management Plan (SIMP), provides information on the most significant social impacts and benefits that the gas field will have on the respective communities covered in the study area. These are summarised below:

- population impact and demographic profile
- indigenous Australians
- employment, training and business
- housing and accommodation
- community health and safety
- facilities and services
- community values, lifestyle and issues of income and affordability.

Population impact and demographic profile

The population of the gas fields study area was found to be 22,890 and with up to 2,100 employees associated with this project, the study area's population could increase by 9 per cent. By 2013, APLNG expects that the demographic profile of the construction workforce will most likely be young and dominated by males. APLNG does not believe the impact to the overall male to female ratios or the proportion of people in age categories will be significant given that this group of workers will be operating on a fly-in/fly-out or drive-in/drive-out basis. The population increase during the construction phase will be mitigated to some extent by employing locals where possible and by accommodating workers in temporary accommodation facilities.

The operational workforce, with an average of 471 workers required between 2011 and 2027 will be accommodated in temporary accommodation facilities close to site, or within existing communities to suit the ongoing operation requirements.

The impact on the existing demographic profile is not expected to be significant due to the size of the operational workforce relative to the existing population.

While the proponent notes a number of potential benefits of this population increase and profile changes, including increased population stability and economic vitality, a number of potential negative impacts are also identified relating to housing, health and safety, social infrastructure and traffic and transport. These are discussed under their respective headings below.

⁶ EIS Vol 2 3.5.8 and also Fig 3.26



Indigenous Australians

1,314 persons of Aboriginal and/or Torres Strait Islander heritage reside in the gas fields study area of which the majority (45 per cent), reside in Dalby. Indigenous households incomes were lower than the Australian average and there was considerable variation within the gas field communities, ranging from A\$575 per week for Indigenous households in Tara, compared with \$971 per week for Indigenous households in Wambo.

The proponent has identified the following impacts on Aboriginal and/or Torres Strait Islander people:

- reduced ability to access affordable housing
- difficulty in securing and retaining employment on the project
- lack of business development opportunities realised.

APLNG has developed an Indigenous Engagement Strategy and has embedded Indigenous outcomes in many of its strategies relating to housing and employment and training.

Employment, training and business impacts

Key industry sectors identified in the gas fields' study area include agriculture, forestry and fishing, construction, mining (including CSG-LNG), manufacturing and retail trade.

APLNG has stated it will prioritise local employment over non-local employment, subject to skill and training limitations even though it is expected that the majority of the construction workforce will be sourced from outside the local and regional area. Bringing economic opportunities for locals through employment is important given that in 2007, 49.4 per cent to 64.8 per cent of residents in communities located within the gas fields' area were receiving some form of government allowance; compared to 18 per cent for Queensland.

The large labour force requirements of the APLNG project, and the social cumulative impact of several major CSG projects proceeding in the region, will have a significant impact on local/regional labour force availability, particularly during the construction phase of projects. Social impacts identified by the proponent include:

- inflationary pressure on commercial real estate costs impacts on local businesses
- impact to local and regional businesses losing employees to the project
- opportunities for apprenticeships, scholarships and vocational training.

APLNG advises it will develop a Workforce Plan, implement operations training and employment programs to encourage local, Indigenous and under-represented participation and will work with Energy Skills Qld (ESQ) to identify skills gaps and subsequent training in these areas.

Housing and accommodation

The median price of houses in the gas fields' urban centres has grown significantly during the last five years. High rental rates have also occurred resulting with rental increases in the vicinity of 55 per cent in Chinchilla and 95 per cent in Roma since the 2006 census. The upwards pressure on rent for the last decade has presented challenges for people sourcing affordable accommodation.

APLNG have assessed that the demand for housing is not expected to be significant as construction workers will be accommodated in temporary accommodation facilities, although the proponent acknowledges that the project will have an indirect impact on housing demand due to increased regional growth. There are approximately 8,376 dwellings located in the gas fields' study area and it is expected some increases in demand for housing will result due to associated businesses, contractors or consultants staying in towns rather than onsite. The increased pressure on housing during the pipeline phase could correspondingly increase the cost of goods and services in the short to medium term and increase demand on infrastructure.

Potential cumulative construction workforce requirements of all of the relevant projects is estimated as being up to 6,300 construction workers by 2012, with an average of 3,400 workers required for the 2009 to 2016 period. It is expected that the majority of these workers would be accommodated in temporary accommodation facilities.



Social impacts identified by the proponent include:

- increase in housing and/or rental prices caused by increased demand and limited supply resulting in poor levels of housing affordability and an over-inflated market
- increase demand for hotel/motel accommodation that in turn presents challenges for competing local industry and businesses.

APLNG advises it will develop a Integrated Housing and Accommodation Strategy for the project to mitigate against the impacts on housing affordability and will establish partnerships with stakeholders including the Urban Land Development Authority (ULDA), Department of Communities and local housing providers. The strategy will include options to provide additional housing stock and the inclusion of a relocation and integration package for relocating workers and families.

In addition, APLNG has advised that the Community Investment Strategy will identify programs to support and focus on providing assistance to people in housing distress. Temporary Workers Accommodation Facilities (TWAFs) will also be secured for the construction workforce to minimise demand for housing in the gas fields and pipeline communities.

The Integrated Housing and Accommodation Strategy will also outline measures to collaborate with the commercial accommodation/tourism sector to ensure the project is not leading to a lack of access to commercial accommodation for other users such as tourists and business travellers.

Facilities and services—increased demand

APLNG has identified the following potential negative social impacts and benefits of its Project including:

- increased demand on affordable housing
- increased demand on child care, family support and youth support services
- incremental increased demand on community and cultural facilities such as libraries, parks, community centres and sporting grounds
- an increased membership pool for community, cultural and sporting associations
- an increased demand for education—local school enrolments.

The APLNG Community Investment Strategy will be developed to mitigate against these impacts by contributing to social infrastructure, partnerships, sponsorships and donations, and employee giving and volunteering. The strategy will focus on addressing skills development and education, natural resource stewardship, safe and healthy communities and sustainable management of population influx.

Community health and safety impacts

The proponent has identified a number of potential social impacts on community health and safety during project construction and operations. These include:

- additional pressure on health and medical services provided by general practitioners and community health centres
- community concern about health and safety impacts resulting from the project
- potential for socially unacceptable behaviour due to the increase in population and changed demographics
- increased road traffic reducing road safety and causing traffic congestion.

APLNG has advised it will implement a Community Health and Safety Action Plan that will mitigate adverse health and safety impacts. Emergency service providers input will be sought in the development of the plan. Traffic Management Plans will also form a key component of the Community and Health and Safety Plans. APLNG have advised that a Code of Conduct and Project Rules will cover inappropriate behaviour in the community which can be directly attributed to APLNG employees and contractors. Inappropriate or unlawful behaviour will be investigated internally and disciplinary action undertaken if required.

Community values, lifestyle and issues of income and affordability

The proponent has identified a number of potential negative impacts on community lifestyle and values during project construction and operations.



These include:

- increased cost of living due to inflationary pressure for higher average weekly incomes
- social divide resulting from increased wage-gap (that is, the 'haves and the have-nots')
- impact to operation of agricultural businesses
- negative effects on lifestyle due to noise, vibrations, dust, air emissions and artificial light.

APLNG advises that it will implement a Community Health and Safety Action Plan that will mitigate adverse health and safety impacts. A complaint grievance mechanism is to be implemented by the proponent that will address issues of quality of life including noise, vibration, dust and safety issues.

Gas pipeline

The Gas Pipeline component of the APLNG Project is approximately 450 km in length, stretching from the northern Walloons area near Miles traversing through Western Downs, Banana and North Burnett towards the LNG facility planned for Curtis Island, Gladstone. The population of the gas pipeline SLAs is 19,638 and the following localities will be in close vicinity to the pipeline component network including:

- Taroom, Cracow, Biloela—Banana Shire
- Wandoan, Murilla and Miles—Western Downs Regional Council

The route for the gas pipeline has been chosen to minimise potential impacts, provide co-location opportunities with other proposed and existing pipelines and is largely located on private property.

The Proponent has identified approximately 204 landholders who may be directly affected by the gas transmission pipeline.

The APLNG draft Social Impact Management Plan (SIMP), provides information on the most significant social impacts and benefits that the gas pipeline will have on the respective communities. These are summarised below:

- population impact and demographic profile
- indigenous Australians
- employment, training and business
- housing and accommodation
- community health and safety
- facilities and services
- community values, lifestyle and issues of income and affordability.

Population impact and demographic profile

The total population of the gas pipeline SLAs was 19,638 in 2006, with the Banana SLA accounting for nearly three quarters of the gas pipeline population. Employment in these SLAs is dominated by the agricultural, mining and manufacturing sectors.

The construction for the gas pipeline is expected to take approximately 18 months commencing in 2012. The pipeline will be constructed with a total workforce of approximately 800 people, including 150 specialists starting work in difficult-to-construct areas along the route. The balance of the workforce will comprise an advance crew of 20 to 30 people. Skilled staff and/or contractors will be deployed to deliver scheduled or unscheduled maintenance. Approximately 20 people will be required for operation and maintenance of the gas pipeline.

Additional personnel will be employed in supporting logistics functions, such as the transport and supply of materials and services to the gas pipeline construction effort. Approximately 100 people will be employed in the project office in Brisbane.

• Indigenous Australians

In 2006, there were 1,617 residents persons of Aboriginal and/or Torres Strait Islander heritage in the gas pipeline study area. Of this population, the majority, 552 or 67 per cent resided in Gladstone followed by Banana SLA (27 per cent).



The proponent has identified the following impacts on Aboriginal and/or Torres Strait Islander people:

- reduced ability to access to affordable housing
- difficulty in securing and retaining employment on the project
- lack of business development opportunities realised.

APLNG has developed an Indigenous Engagement Strategy and has embedded Indigenous outcomes in many of its strategies relating to housing and employment and training.

Employment, training and business impacts

While APLNG is aiming to improve opportunities for local people, it recognises the constraints on local labour due to low unemployment rates in the study area as well as the need to import staff with specialised skills. As such, it is expected the majority of the construction workforce will be sourced from throughout Queensland and nationally.

For those employees sourced locally it is anticipated that the impacts will be minimal due to the short construction period and the importing of staff with specialised skill. APLNG acknowledge that the cumulative effect of projects is anticipated to peak at approximately 5,550 workers in 2012. This could potentially impact on the workforce by increasing pressure on labour force availability and cause a noticeable drain on the availability of staff for local businesses.

In terms of the operation of the pipeline, APLNG do not expect the local labour market to be impacted on significantly as the number of workers required is small compared to the overall job market, with approximately 20 people required. However, APLNG acknowledge that the cumulative requirements for approximately 68 workers required for all projects, may contribute to a regional skills shortage in an already stretched labour market.

The proponent recognises the impact of the construction and operation of the gas fields and pipeline on the operation of agricultural businesses and is committed to integrate and managing Project activities in consultation with landowners.

Housing and accommodation

At the time of the 2006 Census, there were approximately 7,075 dwellings in the gas pipeline SLAs. Communities within the study area have experienced significant increases in the median house prices with house prices in Miles, increasing on average by 28.6 per cent and the price for units in Biloela increased by some 307.1 per cent in periods from 2004 to 2008.

The gas pipeline construction will progress from south to north at approximately 2km per day. Several Temporary Workers Accommodation Facilities will be required sequentially (every 2 months) to house the workforce throughout construction. On average, 600 people are expected to reside in the main Temporary Workers Accommodation Facility, working 12-hour shifts for four weeks on and nine days off. In addition to the main construction crew, there will be specialist crews of up to 200 people working elsewhere and they will reside in additional smaller temporary accommodation facilities (known as 'fly camps').

The temporary accommodation facilities are planned to ensure the temporary workforce does not negatively impact existing accommodation resources in the region with the constructions workshops and lay down areas to be co-located with temporary accommodation facilities.

Following completion of construction, a workforce of 60 will be required for commissioning of the gas pipeline (readying the pipeline for gas delivery). The commissioning workforce will be a rolling workforce who will work 12 hours per day, on a four weeks on/one week off roster and will last two months. Ongoing operational needs will be met by skilled staff and/or contractors who will be deployed to deliver scheduled or unscheduled maintenance. Approximately 20 people will be required for operation and maintenance of the gas pipeline.

Impacts identified by the proponent include:

- increase in housing and/or rental prices caused by increased demand and limited supply resulting in poor levels of housing affordability and an over-inflated market



- increased demand for hotel/motel accommodation presents challenges for competing local industry and businesses.

The proponent will develop a Integrated Housing and Accommodation Strategy to mitigate against the impacts on housing affordability and will establish partnerships with stakeholders including the ULDA, Department of Communities and Local Housing Providers. The strategy will include options to provide additional housing stock for part of re-locating operational and the inclusion of a relocation and integration package for relocating workers and families.

In addition, the APLNG Community Investment Strategy will identify programs which focus on providing assistance to people in housing distress. Temporary Workers Accommodation Facilities (TWAFs) will be secured for the construction workforce to minimise demand for housing in the gas fields and pipelines communities.

The Integrated Housing and Accommodation Strategy will also outline measures to collaborate with the commercial accommodation/tourism sector to ensure the project is not leading to a lack of access to commercial accommodation for other users such as tourists and business travellers. This will be a particular focus in Biloela during the construction of the pipeline.

Community health and safety impacts

The proponent recognises that the communities may be impacted by the project, especially for the construction of the gas pipeline where a male-dominated workforce of over 800 people will potentially be working and residing in close proximity to some of these localities. Impacts identified include:

- community concern about health and safety impacts resulting from the project
- potential for socially unacceptable behaviour due to the increase in population and changed demographics
- increased road traffic reducing road safety and causing traffic congestion.

The proponent will implement a Community Health and Safety Action Plan that will mitigate adverse health and safety impacts. Emergency service providers input will be sought in the development of the Plan. Traffic Management Plans will also form a key component of the Community and Health and Safety Plans. A Code of Conduct and Project Rules will cover inappropriate behaviour in the community which can be directly attributed to APLNG employees and contractors. Inappropriate or unlawful behaviour will be investigated internally and disciplinary action undertaken if required.

Facilities and services—increased demand

APLNG has identified the following potential impacts on and benefits to social infrastructure:

- increased demand on affordable housing
- increased demand on child care, family support and youth support services
- incremental increased demand on community and cultural facilities such as libraries, parks, community centres and sporting grounds
- an increased membership pool for community, cultural and sporting associations
- an increased demand for education—local school enrolments.

The APLNG Community Investment Strategy will be developed to mitigate against these impacts by contributing to social infrastructure, partnerships, sponsorships and donations, and employee giving and volunteering. The strategy will focus on addressing skills development and education, natural resource stewardship, safe and healthy communities and sustainable management of population influx.

Community values, lifestyle and issues of income and affordability

Social impacts to levels of affordability due to the construction of the gas pipeline are expected to be minimal and short to medium-term in nature.

Impacts identified include:

- the potential impacts on Good Quality Agricultural Land (GQAL) in cropping and potential cropping areas



- avoiding damage to existing infrastructure in the vicinity of the gas pipeline, including other pipelines and services, buildings and bridges.

LNG facility

The APLNG Project involves the development, construction and operation, within the Curtis Island Industry Precinct (CIIP) of the Gladstone State Development Area (GSDA), of an LNG processing plant (LNG Facility) with production capacity up to 18Mtp million tonnes a year and nominally comprising of up four LNG processing units or 'trains', noting that the final configuration of the LNG facility is yet to be determined. The construction of the LNG facility will be developed in stages. Construction of train 1 of the LNG plant and associated marine facilities is proposed to commence in 2011 with completion by late 2014. Construction of train 2 will commence essentially simultaneously with train 1 and be complete in 2015.

The construction workforce will consist of a mix of local hires within a 60 km radius of the Gladstone post office and workers recruited from other parts of Australia. The construction workforce will be recruited locally as much as possible and there are no plans at this stage to source labour from overseas. The largest construction workforce requirement occurs in 2013 and again in 2018 where a peak of 3,300 workers will be required.

Approximately 660 workers will need to be sourced locally to achieve a target of 20 per cent local employment at peak. It should be noted that the local workforce may involve people who are currently residing outside of Gladstone but who move within the 60 km radius to access employment opportunities. The local workforce will be accommodated in existing housing stock in Gladstone and the surrounding area, and the non-local workforce accommodated in the TAAF at the LNG facility construction site at Curtis Island.

Subsequent to the EIS APLNG has advised that it is intended to expand the worker accommodation layout on Curtis Island from 1,800 to 2,600 beds at peak to account for 80 per cent of the workforce who will be employed on a FIFO basis. The LNG facility is planned to operate 24 hours per day, seven days a week.

Potential social impacts of the LNG facility

The APLNG draft Social Impact Management Plan (SIMP), provides information on the most significant impacts and benefits that the LNG facility will have on the respective communities.

These are summarised below:

- population impact and demographic profile
- indigenous Australians
- employment, training and business
- housing and accommodation
- community health and safety
- facilities and services
- community values, lifestyle and issues of income and affordability.

Population impact and demographic profile

Gladstone is a major industrial and service centre located in Central Queensland. The estimated resident population of Gladstone Regional Council at 30 June 2009 was 59,644 people. As a result of the development of the construction of the LNG facility, it is estimated that the population of Gladstone will increase and may place undue stress on existing infrastructure and services. The proponent also has highlighted the potential for an increase in the proportion of young males due to construction workforce demographics.

A number of strategies have been identified by the proponent to help mitigate and maximise the impact of the LNG facility in Gladstone including an Integrated Housing and Accommodation Strategy and a Workforce and Training Strategy to provide training and employment opportunities through the project.



Indigenous Australians

At the time of the 2006 census, there were 1,479 resident persons of Aboriginal and/or Torres Strait Islander heritage in the study area. Although there is a considerably higher unemployment rate for Indigenous people in the Gladstone region (17.4 per cent) when compared to Queensland (13.1 per cent), the overall indigenous workforce participation rate within the study area is 62.4 per cent.

The proponent has identified the following impacts on Aboriginal and/or Torres Strait Islander people:

- reduced ability to access to affordable housing
- difficulty in securing and retaining employment on the project
- lack of business development opportunities realised.

APLNG has developed an Indigenous Engagement Strategy and has embedded Indigenous outcomes in many of its strategies relating to housing and employment and training.

Employment, training and business impacts

APLNG is committed to enhancing the positive contribution of the project to the local economy. The Project will implement a Local Content Strategy including participation in, or establishment of programs which assist qualified local and regional businesses to tender for provision of goods and services for the project.

APLNG aims to source at least 20 per cent of the construction workforce locally but has highlighted the workforce demands to meet this objective given the potential of cumulative employment associated with a number of projects in the region. Despite this, the proponent is committed to increase labour force participation.

It is expected that a significant portion of the services required for an APLNG TWAFF are anticipated to be drawn from the Gladstone economy. Interaction with the local economy is anticipated to be most prevalent on employees' days off. Workers will be able to access the local economy during this period with the expectation that ferry services would be provided to access the mainland in the evenings, on occasion, and on worker's days off.

The project will be faced with challenges in sourcing the significant quantities of labour required to construct the LNG facility and marine facilities on Curtis Island.

Housing and accommodation

At the time of the 2006 census there were approximately 16,700 dwellings within the study area with the median house price ranging from \$360,000 in Gladstone to \$430,000 in Tannum Sands. In 2008, one quarter of the private rental stock available in the Gladstone region was affordable for low income earners, similar to the Queensland average.

There is a high probability that the project will impact housing supply and affordability through an increase in demand for accommodation by construction and operational workforces. Through consultation, the proponent has identified that this has emerged as a key issue of concern for both the community and local and state government agencies. APLNG is proposing to accommodate up to 80 per cent of the construction workforce in TWAFF with the remainder of the workforce housed within the existing housing market in the Gladstone area. In the first 14 months whilst the TWAFF on Curtis Island is being constructed, it is proposed that the workforce will be accommodated in a mix of existing housing where available and/or a proposed commercial temporary accommodation facility.

An Integrated Housing and Accommodation Strategy will be developed and implemented for the APLNG Project to ensure housing and accommodation impacts associated with the project are minimised and sustainable opportunities for community and social housing are supported in collaboration with partner agencies.

The Integrated Housing and Accommodation Strategy will outline commitments and processes to:

- facilitate the creation of new permanent housing accommodation
- manage worker housing



- facilitate investment in affordable housing
- increase the capacity of community housing providers
- minimise impact on short-term accommodation.

Facilities and services—increased demand

Social infrastructure in the Gladstone region may be affected due to demand from APLNG project staff. In particular, the proponent has identified the following potential impacts on social infrastructure:

- increased demand on community services and facilities, including:
 - medical and health services
 - education
 - child care services and those suited to a range of working hours
 - family support services especially for vulnerable young people
 - access to disability support
 - increased demand for community support services and facilities (for example child care, public transport, airport, family services)
- impacts due principally to population increase, with some increased demand from the FIFO workforce including the increase in the number of overseas workers in the community.

APLNG will provide first response medical services at Curtis Island and will engage with emergency service and Qld health departments to ensure that workforce data is provided in a timely manner to assist with demand planning.

The Community Health and Safety Strategy will assist in identifying opportunities through local communities and emergency service providers to alleviate any potential increased demand to medical and health services. The Community Investment Strategy will outline how APLNG will collaborate with community support service providers and the community to develop programs that assist in building capacity within support services.

Community health and safety

The proponent has identified a number of potential impacts on community health and safety during project construction and operations. These include:

- potential change in the perception of community safety due to an imbalance in the single male population and the potential for socially unacceptable behaviour
- increased demand on medical and health services
- concern about potential impacts of industry on health, with the main concern being air pollution and dust.

APLNG will provide first response medical services at Curtis Island and will engage with emergency service and Qld health departments in this process. The Community Health and Safety Strategy will assist in demand management on medical and health services. The Community Health and Safety Strategy will incorporate Traffic Management Plans.

The TWAF Code of Conduct and Project Rules will further be strictly enforced. The Code of Conduct and Project Rules extend to cover inappropriate behaviour in the community which can be directly attributed to APLNG employees and contractors.

Community values, lifestyle and issues of income and affordability

The proponent has identified a number of potential impacts on community lifestyle and values during LNG Facility construction and operations. These include:

- increased cost of living due to inflationary pressure from higher average weekly incomes
- increased demand for hotel/motel accommodation presents challenges for competing local industry and businesses
- the region's growth will impact local community values and residents' lifestyle patterns



- shift work employment decreases the time spent with their families and participation in community activities (including volunteering)
- relationship between increased disposable income and how people spend it (for example, increased spending on gambling, alcohol or drugs) impacting on community values
- impact of lighting, dust and noise to community amenity and lifestyle
- community concerns about environmental, social or economic issues.

The proponent has identified a range of initiatives for the Gladstone region to mitigate against the negative impacts and strategies to boost the local economy and economic participation rates for vulnerable groups of people. These include: a Integrated Housing and Accommodation Strategy; a Community Investment Program; a Workforce and Training Strategy; an Indigenous Engagement Strategy and a Local Content Strategy.

6.2.2. Agency issues

In section 6.2.4 of this report it is noted that the proponent prepared a draft SIMP during the EIS process. APLNG subsequently updated its SIMP in the supplementary material provided to stakeholders in August 2010. The revised draft SIMP was developed by incorporating EIS feedback from councils, state agencies, organisations (Indigenous and environmental) and private submitters. The revised SIMP strategies were also informed by consultations with key stakeholders undertaken by the proponent following the EIS.

Gladstone, Maranoa and Western Downs Regional Councils all raised similar issues in EIS submissions regarding the impact the project would have on the demand for health and community services and housing. Councils' also sought a guarantee that economic opportunities for local residents and young job seekers would result from the project and Gladstone Regional Council sought further information on the roles and responsibilities of key stakeholders identified in the SIMP.

Many of the mitigation strategies contained in the revised SIMP now deal these concerns. It is noted however, that Councils' have some residual concerns regarding the effectiveness of the strategies given the proponent has not released its Community Investment Strategy.

Conditions have therefore been set that the final SIMP submitted for Coordinator-General's approval must:

- Demonstrate that the proponent has taken reasonable steps to achieve agreement on the strategies contained in the final SIMP by the relevant stakeholders and that agreement has been obtained on the lead and assisting roles of stakeholders in the delivery of the SIMP strategies
- Demonstrate that the investment outlined in the Community Investment Strategy and Commitment Register has been incorporated into the final Social Impact Management Plans and that the proponent has taken reasonable steps to achieve agreement on these commitments with relevant SIMP stakeholders

Where final agreement has not been reached on social impact mitigation strategies (and the proponent provides evidence of reasonable steps have been taken to achieve agreement) a condition has been set requiring the proponent to identify the actions proposed to resolve these matters. Outcomes of these stated actions will be reviewed in the first annual report requirements of the SIMP.

The key issues raised by submitters in response to the Social Impact Assessment section of the EIS relate to:

Housing impacts

- although available, housing is unaffordable for some sectors of the Gladstone community and industry compounds these problems
- short term accommodation stress associated with increased population and workers
- general impacts on supply of affordable housing
- access to affordable housing for non-resource workers required to service the regions
- impacts on affordable housing and risk of significant housing shortages or increased housing costs for Aboriginal people.



Workforce accommodation

- the location of the construction camp on Curtis Island may increase policing requirements for both the island, the mainland and on the water
- the size, design and location of TWAF within the gas field and throughout the 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.

Social infrastructure and community services

- cumulative impacts of multiple projects will compound the social impacts and the need to effectively manage this
- the strain on social infrastructure (e.g. schools, community and cultural facilities, sport and recreation facilities), including effective monitoring and timely corrective action due to the large increase in population
- workforce access to services on the mainland for recreational, health or social service purposes
- the capacity of emergency services to meet service standards in responding to emergencies
- requirement for additional police resources, including need for staffing increases to the respective Police Region, new police stations, specialist resources and other equipment needs
- social, economic and transport issues/impacts on Toowoomba City as the regional centre needs to be considered.

Workforce 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
- need for employment strategies and support programs that maximise employment opportunities for vulnerable groups, people with a disability and for Indigenous people including support for job preparation and training
- the need for better social integration options for the workforce into the communities
- the impact on communities due to the high influx of male dominated workers into the project regions.

Traffic, safety and health

- increased demand for emergency and police services associated with the project
- the increase in transient worker populations may increase demand for disaster response, but provide little opportunity to increase membership of volunteer services (SES, rural fire), putting extra pressure on existing services
- minimal information in the EIS on how demands on health services will be mitigated
- increased transport infrastructure demands for infrastructure and services
- management of incidents and complaints regarding traffic and transport movements.

Community engagement

Overall EIS and supplementary agency EIS submissions acknowledged the need for on-going consultation by the proponent in finalising the SIMP to ensure the impact management strategies accurately reflect the needs of residents, businesses, governments, key stakeholders in the community. Submitters emphasised the importance of ongoing involvement in the project through a range of consultation mechanisms including Regional Community Consultation Committees (RCCCs), which would allow the community to be kept informed and consulted throughout the life of the project.

Coordinator-General's conclusion

Issues raised in the agency EIS submissions in relation to the potential social impacts associated with this project are noted, both during construction and for the life of the project.

The issues across the three project areas relate to:

- (a) labour force skills and training



- (b) migration of regional workforce to projects
- (c) housing and accommodation pressures
- (e) other property owners land use
- (f) social infrastructure.

6.2.3. Cumulative impacts of the project

In both the EIS and supplementary information provided to key stakeholders, submitters including Western Downs and Gladstone Regional Councils, Queensland Health and Department of Communities raised issues in relation to the potential cumulative impacts of multiple LNG projects being developed simultaneously in the region.

The main cumulative social impact issues raised by submitters during the EIS process were similar to recent LNG projects given approval, including:

- changing demographic profile of the region
- the need to work collaboratively with other LNG proponents on identifying cumulative impacts. This should not only apply to the post approval but during the EIS stage
- 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 and the impact this may have on low to moderate income earners
- 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, particularly cumulative air quality levels in the Gladstone region.

Coordinator-General's conclusion

Consistent with previous Coordinator-General Report's, it is considered that multiple projects could if concurrent, add more pressure than a single project to: housing and housing affordability; demands on community facilities and services and have the potential to change community values as the workforce grows and economic activity increases.

6.2.4. Social Impact Management Plan

Government policy

The Queensland Government's "Sustainable Resource Communities Policy" (the 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 EIS 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 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. This provision includes infrastructure for airports, sporting facilities, trades and training centre and housing initiatives.



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 EP Act or the 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. The Department of Infrastructure and Planning (DIP) Social Impact Assessment Unit (SIAU) has prepared a draft SIMP guideline and template to assist proponents with the development of SIMPs.

The guideline has now been finalised, with the SIMP to become integral to the EIS process through proposed legislative amendments planned for early 2011

It is noted that the proponent has prepared a draft SIMP in the EIS and subsequently updated the document in the supplementary information in August 2010.⁷ The revised draft SIMP has been developed in close consultation with key stakeholders.

APLNG draft SIMPs

APLNG has drafted three separate SIMPs in the EIS to reflect the three stages of the LNG project (gas fields, pipeline and LNG facility). In the supplementary material provided to stakeholders in August 2010, the three SIMPs had been revised to two—the first combines the gas fields and pipeline project phases with the second SIMP devoted to the LNG Facility at Gladstone.

The structure of the two SIMPs is similar and is described below:

- Section 1:** Describes the purpose and structure of the draft SIMP and provides an introduction to the project
- Section 2:** Establishes the baseline for the mitigation strategies through a description of the project, the existing socio-economic environment present in the study area and an overview of the community engagement undertaken to date
- Section 3:** Provides an overview of the potential social and economic impacts and benefits to be addressed through the SIMP and mitigation action plans associated with the key impact areas
- Section 4:** Presents a framework for the proposed Monitoring, Reporting and Review Program
- Section 5:** Outlines the proposed Community and Stakeholder Engagement Strategy for the project including processes to engage with the community regarding the ongoing development and implementation of the SIMP
- Section 6:** Details the APLNG Grievance and Dispute Resolution policy

To address the impacts identified during the EIS and supplementary advice provided by key stakeholders, APLNG's SIMP describes a range of strategies that centre on the following themes:

1. housing and accommodation
2. community investment
3. Indigenous engagement
4. workforce and training
5. local content
6. community health and safety.

⁷Supplemental Information <http://www.aplng.com.au/eis-pdfs>



APLNG has committed to developing action plans for each of the key themes. These plans will link mitigation measures to impacts which will be assessed and reviewed over the life of the project. The plans will align with the aims and objectives of existing local and regional strategies and policies. An outline of the proposed strategies is provided below.

SIMP strategies

While the APLNG has two SIMPs (one for the gas fields and pipeline and one for the LNG Facility) the six action plans described above are common to both SIMPs. Significant differences between the project phases in the action plans are highlighted below.

Housing and Accommodation action plan

Common to both SIMPs will be the development of an Integrated Housing and Accommodation Strategy and action plan to ensure housing and accommodation impacts associated with the project are minimised. It will establish sustainable opportunities for community and social housing in collaboration with partner agencies. The Integrated Housing and Accommodation Strategy will outline commitments and processes to:

- facilitate the creation of new permanent housing accommodation
- manage worker housing
- facilitate investment in affordable housing
- increase the capacity of community housing providers
- minimise impact on short-term accommodation.

Through the Integrated Housing and Accommodation Strategy, APLNG will work with Department of Communities, community housing providers and councils to identify demand and address affordable and social housing in the gas fields, pipeline and LNG facility study areas.

Gas field and pipeline

Measures include providing accommodation for the construction workforce in the gas fields and pipeline region utilising temporary accommodation facilities and providing accommodation for commuting operational workforce, who reside greater than 50 km from site in permanent camps. Additionally, actions which assist those workers relocating to the region to integrate with the local community will be undertaken. APLNG will, if required by market conditions, invest in worker housing and affordable housing in the region to reduce project induced housing cost growth.

LNG Facility

The plan identifies measures to mitigate the potential impacts of rising housing costs in the Gladstone region, due to an influx of construction and operations workers. Measures include providing accommodation for the construction workforce in temporary accommodation facilities and supporting the increased availability of affordable housing. Additionally, actions which assist those workers relocating to the region to integrate with the local community will be undertaken.

Community Investment Strategy

APLNG has proposed the development and implementation of a Community Investment Strategy (CIS) and action plan to mitigate against potential project related social impacts. The CIS will invest in social infrastructure, target community capacity building and strengthen existing and new programs and services as required. It will also establish partnerships, sponsorships and donations program plus an employee giving and volunteering framework.

The governance structures for the CIS (in both SIMPs) will ensure community input into decision and will align with regional plans and other recognised funding frameworks both Government. The Regional Community Consultative Committees (RCCCs) will be used to provide guidance for funding allocations based on key community needs and to assess effectiveness of programs throughout the project life cycle.

Gas field and pipeline

The APLNG CIS will focus on addressing skills development and education, natural resource stewardship, safe and healthy communities and sustainable management of population influx. A key



component in delivery of the CIS will be to ensure participation of key stakeholders in any investment consideration most notably through the RCCCs.

APLNG is committed to developing the CIS in line with any regional or state government initiatives including the Surat Basin Future Directions Program and Gladstone Region Social Infrastructure Voluntary Industry Contributions Framework. The proponent is committed to working in collaboration with industry, government and community to target investment under the CIS.

LNG facility

As with the pipeline and gas fields SIMP, the proponent is committed to aligning its CIS investment decisions to overarching regional and government initiatives such as Gladstone Region Social Infrastructure Voluntary Industry Contributions Framework (SISP). The Gladstone SISP has identified a number of key areas under stress in relation to social infrastructure provision, including:

- demand to affordable housing
- demand to medical and health facilities (particularly relating to primary health care services)
- decreased rates of volunteering in the local region
- child care provision
- public transport links.

The proponent is committed to working with industry, government and community in this respect.

Indigenous Engagement Strategy

APLNG is committed to developing and implementing a comprehensive Indigenous Engagement Strategy and Action Plan to mitigate potential negative impacts and develop opportunities for social and economic development for Indigenous Australians.

Key elements of the strategy are:

- contribute to training and education
- provide employment opportunities
- assist Indigenous businesses with business development and foster respect and understanding within APLNG
- continuous engagement with Indigenous communities, organisations and representatives to ensure ownership of strategies and actions.

Gas field and pipeline

Through the Indigenous Engagement Strategy the following initiatives will be implemented:

- education and training—providing support for community based traineeships /apprenticeships and school based traineeships
- employment—identifying available positions for workplace traineeships/apprenticeships, assisting indigenous businesses in the gas fields and pipeline areas to establish relationship with existing indigenous businesses to facilitate joint venturing opportunities
- health and wellbeing—developing and implementing cultural heritage management training for all employees and contractors and incorporate into induction process
- business development and support—identifying work packs which can be split from principal contracts to allow indigenous and other businesses to supply smaller contracts where appropriate
- cultural heritage—finalise Cultural Heritage Management Plans with all traditional owner groups and implement management plan to ensure compliance to agreement.

LNG facility

Through the Indigenous Engagement Strategy the following initiatives will be implemented:

- education and training—providing an indigenous training mentor to provide support to trainees and apprentices working on construction of the LNG facility and providing support for community based traineeships /apprenticeships and school based traineeships
- employment—identifying available positions for workplace traineeships/apprenticeships and undertake an indigenous skills and capacity audit in conjunction with local indigenous employment and training services providers to establish a baseline of existing skills



- health and wellbeing—ensuring that sponsorships and donations for indigenous event and services based upon the APLNG's Indigenous Engagement Strategy and Community Investment Strategy
- business development and support—encouraging engagement of indigenous businesses and joint ventures.

Project Workforce and Training Strategy

A key focus of the APLNG Project Workforce and Training Strategy and Action Plan will be working with government to target sectors of the community that are not currently participating in the labour force and to build local workforce capacity through training and development strategies to service the gas fields, gas pipeline area and the Gladstone region.

Gas field and pipeline

The following initiatives will be undertaken as part of APLNG Workforce and Training Strategy:

- work with Energy Skills Qld (ESQ) to conduct an assessment of existing community skills and offer targeted skills training to fill identified gaps
- work with government to target the employment of under-represented groups such as women, people with a disability and Indigenous Australians. APLNG have committed to where possible and appropriate, recruiting a broad range of people as part of the operational workforce
- assist job seekers, readily accessible information and advice will be provided
- establish a centralised Job Referral Centre
- engage with training organisations to increase the local skills capacity for employment during the construction phase of the project and in transition from construction to operations.

LNG facility

The following initiatives will be undertaken as part of APLNG Workforce and Training Strategy:

- APLNG aims to source at least 20 per cent of the construction workforce locally
- continue engagement with the CSG/LNG industry through the CSG/LNG Skills Taskforce to develop awareness and training pathways for the industry
- continue to work with the Queensland Minerals and Energy Academy (QMEA) to encourage career pathways into the CSG Industry to Gladstone
- develop construction workforce programs including training and recruitment pathways to encourage local employment and participation of under-represented groups
- implement operations training and employment programs to encourage local and Indigenous participation as well as under-represented and disadvantaged groups.

Local Content Strategy

APLNG is committed, to the extent that it is reasonably practicable, to source goods and services locally, in Queensland and elsewhere in the Australian economy for the construction of the project.

The Project Workforce and Training Strategy and Community Investment Strategy Action Plans will consider potential project related impacts and methods to assist building local participation and skills capacity to meet the needs of the region and this will be supported by the proponents overarching commitment through its Local Content Strategy and Action Plan.

Gas field and pipeline

The following initiatives will be undertaken as part of APLNG's Local Content Strategy:

- APLNG will develop a Local Content Policy aligned to the Australian Government's Australian Industry Participation Plan
- host procurement road-shows for potential suppliers providing advice regarding prequalification and involvement in the APLNG Project
- APLNG will work with the Industry Capability Network to create a website portal for suppliers to register their expression of interest to work with the project and receive regular updates about procurement and tendering opportunities.



LNG facility

The following initiatives will be undertaken as part of APLNG's Local Content Strategy:

- collaborative relationship with Industry Capability Network to promote opportunities for local business involvement in projects
- develop relationships with key business representative bodies and undertake consultation with members regarding opportunities for supply and capacity of local businesses
- develop processes to ensure local business opportunities are considered in Project procurement practises
- ongoing communication and promotion of project procurement requirements to ensure local businesses are aware of tender opportunities
- provide regular project updates, overview of goods and services packages, supply chain and education to local suppliers.

Community Health and Safety Strategy

The proponent is committed to:

- minimising the demand on health and emergency services
- addressing the impacts of road, air and shipping movements of Project personnel, materials and equipment
- addressing concerns that workers accommodation facilities will foster anti-social behaviour
- providing a safe environment for APLNG employees and community members.

To achieve these objectives, a Community Health and Safety Strategy and Action Plan will be developed in both SIMPs and will consist of the following key initiatives.

Gas field and pipeline

- Provision of workforce numbers and traffic movements to local and state government to assist with infrastructure planning and discussion regarding APLNG's commitment to traffic management and health and safety initiatives
- undertake Emergency Response Planning for construction and operations in collaboration with emergency service providers and neighbours
- expand the Community Safety Awareness program in conjunction with industry partners, Government and community groups to develop responses to community safety concerns in the region
- develop a community complaint and grievance mechanism
- through the development of the Community Investment Strategy, identify opportunities to address community health issues
- integrate project rules and TWAF code of conduct into recruitment and project induction processes.

LNG facility

- Undertake Emergency Response Planning for construction and operations in collaboration with emergency service providers and neighbours
- provide first emergency response resources to site at Curtis Island
- expand Community Safety Awareness Program in conjunction with industry partners, government and community groups to develop responses to community safety concerns in the region
- develop a community complaint and grievance mechanism
- establish and implement Project rules and TWAF Code of Conduct and integrate into recruitment and Project induction processes
- develop and implement 'Fit for Work' and 'Drug and Alcohol' policies for employees and contractors.

Impacts on property owners and land use

In the EIS submissions, issues of land regeneration and the impacts of land use was raised by a number of government agencies and organisations. Submissions sought assurances from the proponent that it would:



- work with landholders and land managers to minimise negative impacts to current land use, including rehabilitation of temporary disturbance in the gas field and pipeline components of the project
- provide an Access Plan to all state-controlled land affected by the project.

In response to EIS submissions, APLNG advised that it will work with landholders and land managers to minimise negative impacts to current land use, including rehabilitation of temporary disturbance. However, this needs to be better translated into the draft SIMPs (refer to section 6.2.4 of the report).

Table 6.1 provides a summary of key social impacts and the strategies proposed to address them in the draft APLNG SIMPs.

Table 6.1—Social impacts and corresponding SIMP strategies

Social impact	Gas fields	Pipeline	LNG facility	SIMP strategy
Population impact and demographic profile	☑	☑	☑	<ul style="list-style-type: none"> • Housing and Accommodation • Workforce and Training • Community Investment • Community Health and Safety
Indigenous Australians	☑	☑	☑	<ul style="list-style-type: none"> • Housing and Accommodation • Community Investment • Indigenous Engagement • Local Content
Community values, lifestyle and issues of income and affordability	☑	☑	☑	<ul style="list-style-type: none"> • Housing and Accommodation • Community Health and Safety • Community Investment • Workforce and Training
Employment, training and business	☑	☑	☑	<ul style="list-style-type: none"> • Workforce and Training • Local Content
Housing and accommodation	☑	☑	☑	<ul style="list-style-type: none"> • Integrated Housing Strategy
Facilities and services	☑	☑	☑	<ul style="list-style-type: none"> • Community Investment
Community health and safety	☑	☑	☑	<ul style="list-style-type: none"> • Community Investment • Community Health and Safety • Housing and Accommodation • Workforce and Training

Coordinator-General's conclusions on SIMP

APLNG is to be commended for releasing the draft SIMP in its EIS and supplying a revised draft SIMP for comment as part of the supplementary information provided to key stakeholders in August 2010. APLNG has ensured its draft SIMPs have been developed in line with the Department of Infrastructure and Planning's draft SIMP guideline.

The proponent has also incorporated recommendations made in previous Coordinator-General Reports for LNG Projects into its draft SIMPs and has undertaken extensive stakeholder consultation with the community, government and other stakeholders in the development of mitigation strategies.



It is noted that APLNG's SIMPs were guided by APLNG's sustainability principles, specifically, principles relating to the social environment including:

- fostering the health and wellbeing of APLNG's workforce
- respecting the rights, interests and diverse cultures of the communities in which APLNG operates
- engaging regularly, openly and transparently with people and communities affected by APLNG's activities, considering their views in its decision-making and striving for positive social outcomes
- working cooperatively with communities, governments and other stakeholders to achieve positive social and environmental outcomes, seeking partnership approaches where appropriate.

While the draft SIMP is well developed, conditions have been imposed in Condition 1 and 2, in Appendix 1, Part 3 in order to ensure that the proponent adequately mitigates the concerns raised in the EIS and supplementary information process in the final SIMP. The finalised SIMP is required to be submitted to the Coordinator-General for approval prior to commencement of construction. Details on the rationale for these conditions are explained below.

6.2.5. Community engagement and dispute resolution

APLNG's proposed community engagement strategy

APLNG has taken an iterative consultation process in the development of its two draft SIMPs allowing key stakeholders to inform the strategic direction of the SIMPs. APLNG has provided detailed information on the consultation they undertook to develop the SIMPs in the EIS. The proponent also describes how supplementary stakeholder consultation after the EIS has informed the next version of the draft SIMPs.

APLNG has identified that a key aspect of the engagement strategy, will be the establishment of a Regional Community Consultative Committee (RCCC) (refer 6.2.4) who will play a significant role in the final SIMP, although it is the view of APLNG that to varying degrees, the SIMP will be necessarily modified and refined in the early stages of its implementation.

APLNG has developed a Community and Stakeholder Engagement Plan to guide the implementation of the final SIMP and this will be made available in full to the relevant RCCC and other stakeholders as required.

It is noted from APLNG's EIS Stakeholder sections, Volumes 2, 3 and 4, that in addition to the SIMP's Community and Stakeholder Engagement Plan, the proponent also has an overarching stakeholder framework to address whole-of-Project issues. Activities under this framework include meetings with landowners, face-to-face-briefings with government representatives and community groups. The engagement framework is aimed at providing community members and stakeholders with timely information and opportunities to actively participate in the project's development.

It is also noted that APLNG used its overarching stakeholder framework to engage with the community during the EIS process including focus groups, community information sessions, one-to-one meetings, newsletters, information sheets, print advertisements and posters, project-dedicated website, email address and toll-free project hotline.

Elsewhere in the EIS, the proponent has also identified a range of stakeholder engagement activities that will occur throughout the project life, including:

- engage with each landowner within the project area prior to any project activity on their land
- assign a dedicated liaison officer to each landowner in the project area. The EIS describes that there are eight local landowner liaison officers, who service the gas fields and gas pipeline elements of the project
- locate and schedule project activities to reduce impacts on landowner activities
- vehicle inspection and cleaning facilities
- code of conduct for working with land owners.

While the issue of affected land owners is identified as an impact by the proponent, the issue is not listed as part of any the six priority areas for action in the draft SIMP.



In terms of minimising noise, vibration, hazard and risk activities to people, property and the environment of abnormal events, natural hazards or accidents associated with construction and operation of each phase of the project, APLNG will implement a community grievance mechanism under its Community Health and Safety Strategy and Stakeholder Engagement Strategy in the final SIMP.

In relation to quality-of-life matters (noise, vibration, and natural hazards) the proponent has indicated that it will:

- maintain an up to date Traffic Management Plan which will include driver fatigue monitoring, driver education and training, enforced speed limits for project vehicles, use of buses to reduce private vehicle use, public access restrictions to work areas; and use of in-vehicle monitoring systems
- initiate and participate in ongoing community campaigns to reduce the likelihood and consequences of vehicle accidents
- locate the gas pipeline at least 100m from sensitive dwellings, commercial premises or cultural heritage listed structures to minimise the risk of cosmetic or structural damage
- schedule non-standard trenching operations such as rock-sawing, rock-hammering or directional-drilling during standard daytime working hours and notify residents or businesses within 200m before any of these activities are conducted
- limit construction activities near dwellings to between 6.30am and 6.30pm, as far as practicable
- undertake out-of-hours construction activities (for example, drilling) in accordance with a noise management plan that addresses the Environmental Protection (Noise) Policy 2008 acoustic quality objectives
- locate temporary accommodation facilities at least 500m from sensitive receptors
- prepare a Traffic Management Plan prior to construction to identify suitable routes and times of travel to minimise disturbances to residents and traffic conditions.

It is noted that the proponent community grievance mechanism is intended to address issues of noise, vibration, hazard and risk activities. This mechanism must incorporate features to ensure that the community has appropriate access and channels to be able to register a complaint.

Impacts on property owners and land use needs to be strengthened in the proponent's SIMPs through the existing six priority areas or as a separate priority.

The proponent is also required to update the gas field and pipeline Community and Stakeholder Engagement Plan to reflect what actions they are taking to mitigate against the impacts on property owners and their existing business or land use during the construction and operation of the gas fields and pipeline. These land use mitigation strategies are to be developed in line with Government's new land access framework that was announced as part of amendments to the *Geothermal Energy Act* due to come into effect by the end of 2010.

APLNG is to be commended for nominating the RCCCs as the main mechanism to engage with the community, notwithstanding that the development of the Community and Stakeholder Engagement Plan is still to be finalised.

APLNG's proposed grievance and dispute resolution mechanisms

APLNG has developed a Grievance and Disputes Resolution Policy which sets out a process for the resolution of a dispute, grievance or complaint. Such dispute, grievance or complaint may be associated with the product, facility and adjacent infrastructure, conduct of business with third party suppliers/contractors, or with other stakeholder interests such as the provision of social infrastructure and community engagement mechanisms.

A community complaint, generally, is categorised as a concern received from a stakeholder that directly relates to the APLNG project, and which cannot be resolved through existing public channels. APLNG aims to provide a range of contact avenues that will allow all stakeholder groups to have direct access to project personnel. The avenues currently available to contact the project are:

- dedicated project telephone hotline
- project website: www.aplng.com.au
- project email address: contact@aplng.com.au
- or through local shop fronts in Gladstone, Roma, Chinchilla, Miles or Brisbane.



In the EIS submissions Western Downs Regional Council raised the need for specific strategies to respond to community complaints. It is noted that APLNG will provide a detailed policy for community members and stakeholders as requested and will be further refined through consultation with the RCCCs once established and the proponent is required to include a range of other mechanisms in its policy in line with the recommendation above relating to noise, vibration, hazard and risk activities (refer to section 6.2.4, APLNG's proposed Community Engagement Strategy).

APLNG's Indigenous engagement

APLNG has committed resources to develop and implement an Indigenous Engagement Strategy to mitigate potential negative impacts and develop opportunities for social and economic development for Indigenous Australians. Key elements of the strategy are to:

- contribute to training and education
- provide employment opportunities
- assist Indigenous businesses with business development
- foster respect and understanding through Indigenous cultural awareness training within APLNG.

The strategy will ensure that it maintains excellence in cultural heritage management, enable a positive contribution to Indigenous economic and social development and will proactively continue to engage with Indigenous communities.

The strategy will help mitigate issues of housing affordability, demand for community and health services and any social divide resulting from increased wage gap. It will also increase the opportunity to support work readiness programs and pre-trade training programs.

Coordinator-General's conclusion

The proponent's strong approach to community engagement and social investment especially in relation to improving Indigenous participation through the development of an Indigenous Engagement Strategy is supported. Comments made through EIS submissions highlighted the need for active strategies to provide positive outcomes for Indigenous people through employment, education and economic opportunities. It is considered that this can best be achieved through a clear commitment to community engagement, social investment and culturally appropriate engagement and programs for Indigenous people. It is recommended that the proponent submits its Grievance and Disputes Resolution Policy with its final SIMP for the Co-Coordinator General's approval. Conditions have been set covering community engagement and dispute resolution in Condition 5, in Appendix 1, Part 3.

6.2.6. Governance arrangements

Industry leadership group for CSG resource projects

APLNG has committed to working with the CSG Industry Leadership Group which was proposed for establishment in Queensland Curtis LNG Coordinator-General Report (June 2010). The role of the overarching Industry Leadership Group for CSG Resource Projects is to 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 facility).

APLNG is to be commended for its willingness to engage with its industry partners, in the establishment of this group and discussion of governance arrangements. Participation in the Industry Leadership Group for CSG resource projects will be reported to and commented upon by the RCCCs. It is noted that this group is to be established separate to the CSG Industry Monitoring Group, which will be formed to identify and manage cumulative industry impacts.



CSG Industry Monitoring Group

In the Queensland Curtis LNG Coordinator-General Report the proponent was conditioned to assist in the establishment, funding of, and participation in a CSG Industry Monitoring Group (CIMG) to assess and report on the cumulative environmental and social impacts of the CSG industry and its activities. It is envisaged that the CIMG will provide an independent and open forum to manage common and emerging environmental and social issues for the CSG/LNG industry in Queensland and may comprise representatives of industry, community, local government, professional associations, technical experts and State regulatory agencies. The group would be separate to the Industry Leadership Group for CSG Resource Projects set out in Condition 2, Appendix 1, Part 3.

The group's objectives would include:

- reviewing project environmental and social impacts and interactions between proponents
- reviewing monitoring data for cumulative environmental impact implications for all proponents
- responding to community concerns and identifying issues where proponents and relevant agencies can take action to manage impacts reviewing impacts on strategic cropping land and good quality agricultural land
- recommending changes to legislation, policies and guidelines to address emerging issues from the CSG and LNG industry.

The proponent is conditioned to contribute and participate in the CIMG once it is established by way of Condition 2. Appendix 1, Part 3.

Regional Community Consultation Committee

APLNG will establish Regional Community Consultative Committees (RCCC) as a key mechanism to foster dialogue with communities and stakeholders, to engage communities in the delivery of the action plans and to ensure participation in social impact monitoring. APLNG has a preference for establishing RCCC's with other LNG proponents where possible. In this regard, APLNG advised it has held preliminary discussions with the other LNG proponents.

It is intended to have the RCCC established pre-FID or immediately thereafter. Currently, APLNG anticipates establishing four RCCCs, including:

- two RCCCs covering the gas fields area, including one in the Maranoa Region and one in the Western Downs region
- one RCCC covering the main gas transmission pipeline area, primarily Banana Shire Council area
- one RCCC for the LNG facility and final section of the gas transmission pipeline, including the Gladstone Regional Council area
- engage in or establish a Industry Leadership Group to identify any opportunities for collaboration or leverage to address cumulative impacts or opportunities to enhance community connectivity and networks.

APLNG has advised it will consider establishing an RCCC in the Toowoomba Region upon the commencement of activities in the Gilbert Gully gasfield (approximately 2027). This is consistent with the commitment within the draft SIMP.

The broad structure of the RCCC's outlined by the proponent includes an Independent Chair and 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.

The proponent has committed to resourcing the RCCC's (financial and in-kind) as documented in the draft SIMP, with APLNG also wanting to ensure proper representation of disadvantaged and underrepresented groups.

It is recommended that the Terms of Reference for these groups are provided to the Social Impact Assessment Unit, Department of Infrastructure and Planning, for review and approval prior to establishing the RCCC's and these are to include:

- details of how the Industry Monitoring Group will be reported to the RCCCs
- the role of the committee in the review and monitoring of the SIMP



- details of any combined RCCC governance arrangements, if applicable.

It is noted that the recent establishment of the Roma and Dalby CSG Consultative Committees announced by Minister Robertson on 23 August 2010 will have a complimentary role to the RCCC. The Social Impact Assessment Unit (SIAU) will advise APLNG (and other LNG proponents) in the near future of the relationship between the RCCCs and the LNG committees to help inform the establishment of the proponent's RCCCs.

Coordinator-General's conclusion

It is clear that APLNG is committed to establishing and resourcing consultative and engagement mechanisms with community stakeholders specifically on the impacts of the APLNG Project.

The proponent has announced its intention to establish governance structures similar to other LNG projects that have been given approval.

It is recommended that the final Terms of Reference for the RCCC's are provided to the SIAU for review and approval.

The report sets Condition 2 with respect to establishing Consultative Committees and Industry Leadership Groups in Appendix 1, Part 3.

6.2.7. Proponent specific measures for managing social impacts

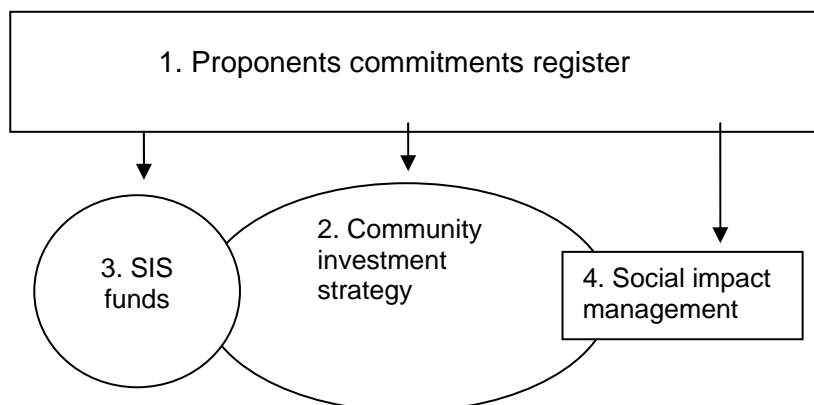
The Surat Basin Future Directions Statement includes a \$23.65M funding package for the Surat Basin and outlined ways in which local communities could work with government and industry to manage the rapid growth associated with the expected boom from the LNG industry.

In previous reports for the LNG proponents it has been emphasised 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. A social infrastructure and service delivery strategy is proposed comprising four integrated elements:

1. proponent's Commitments Register
2. community Investment Program
3. the Social Infrastructure Strategic Plan (SISP) Gladstone and Maranoa/Western Downs regions
4. specific contribution to manage social impact e.g. housing contributions.

The relationship among these integrated elements would be as indicated in Figure 6.1.

Figure 6.1—Integrated social impact funding strategy



Proponent's commitment register

APLNG collated its commitments in Vol 1, Ch 6 of the EIS, for the gas fields, gas pipeline and LNG facility.



The proponent has correlated its Commitments Register to many of the mitigation strategies identified in the SIMPs. While the level of investment is not known at this stage the proponent has clearly worked to ensure that investment decisions undertaken by the proponent will directly support SIMP strategies.

The proponent's commitments are aligned to the six themes identified in the draft SIMP:

1. housing and accommodation
2. community investment
3. Indigenous engagement
4. workforce and training
5. local content
6. community health and safety.

There are however, a number of important issues associated with residents' quality-of-life (noise, vibration, hazard and risk activities to people, property and the environment) and land owner and access issues that are not addressed in detail in the draft SIMP or its mitigation strategies (refer to 6.2.4.4) . There should be a corresponding action plan within the SIMP.

Therefore APLNG is required to address the following areas in the final SIMP and Commitments Register to include:

- land owner and access issues
- impacts associated with noise, vibration
- hazard and risk activities to people
- property and the environment of abnormal events, natural hazards or accidents.

Community Investment Strategy

The proponent has provided a detailed and sophisticated Community and Investment Strategy (CIS) Framework. The Framework comprises of social infrastructure, partnerships, sponsorships and donations and employee giving and volunteering. The strategy will focus on addressing skills development and education, natural resource stewardship, safe and healthy communities and sustainable management of population influx.

A key component in the delivery of the Community Investment Strategy will be to ensure participation of key stakeholders in any investment decision, and while the RCCC's will be one such mechanism, the proponent has identified a number of mechanisms that may need to be employed to ensure community projects match the needs of the community. This may include establishing a Community Reference Group and undertaking an ongoing process of one-on-one consultation with key stakeholders.

The objectives of the CIS are to ensure that there is a direct relationship to social investment and the mitigation strategies identified in the EIS and SIMP, these are in turn underpinned by APLNG's overarching sustainability principals outlined in the draft SIMP. The proponent's draft SIMP outlines a raft of mitigation strategies that will be supported by APLNG's CIS including housing and accommodation, local businesses, Indigenous employment and cultural heritage management, employment and training opportunities.

The proponent outlines that investment in the community will be derived from:

- investment in local facilities and services
- partnership funding focusing on sustainable community development through longer-term, large scale partnerships which facilitate capacity development for large non-government
- organisations (NGOs), Government bodies and community groups
- sponsorships and donations
- support for employee volunteering
- donations towards community activities and volunteering events.

It is not clear, as it is not fully detailed in the draft SIMP, how the CIS will support the proponent's commitments. Section 6.2.5.1 above relates to land owner and quality-of-life issues for residents. In this regard the proponent has not provided details of the quantum CIS funding to the department and that the proponent will work with key stakeholders including regional councils to finalise the strategies and initiatives contained in the in its CIS.



Coordinator-General's conclusion

The proponent is to be commended for providing a detailed Community Investment Framework that includes such initiatives such as employee donations. The framework demonstrates that the proponent has taken a systems approach to social investment by integrating all investment activities and programs across the organisation to maximise its efforts. It also links investment to Government priorities such as the Gladstone Social Infrastructure Strategic Plan. The proponent has also demonstrated that it is committed to a range of community input mechanisms into the investment decisions of the company.

Nevertheless, not all commitments identified in the Commitments Register have been adequately reflected in the proponent's draft SIMP and It is recommended that the proponent should include land access and quality-of-life issues more explicitly in the final SIMP.

While the proponent would not be in a position to quantify its CIS funding prior to finalisation of this Report, it is strongly recommended that the proponent enter discussions with key stakeholders when this is known, to identify how the CIS funding and mitigation strategies in the SIMP will be applied. The outcomes of these discussions are to be described in the final SIMP submitted for the Coordinator-General's approval.

The Social Infrastructure Strategic Plan for Gladstone

The Social Infrastructure Strategic Plan (SISP) for the Gladstone region is a joint initiative of the Gladstone Economic and Industry Development Board, Gladstone Regional Council, and the Department of Infrastructure and Planning to give direction to major project proponents planning to contribute funds towards the development of new social infrastructure facilities and services in the Gladstone region.

The Gladstone Region Social Infrastructure – Voluntary Industry Contributions Framework has been developed through the SISP and is underpinned by a review of all relevant work previously conducted within the region; an audit of the existing stock of regional social infrastructure; benchmarking the levels of infrastructure provision against comparative regions of similar size; a comprehensive assessment of needs through extensive community engagement; and identification of priorities and recommended actions.

APLNG's draft SIMP outlines that it will use the Gladstone SISP to guide corporate investment in social infrastructure to help mitigate project related impacts.

Coordinator General's conclusions

The proponent's commitment to invest in social infrastructure in Gladstone as outlined in its draft SIMP is to be commended. It is considered important that the LNG Projects proposed for Gladstone should fully participate in the implementation of the SISP for Gladstone and so make the following recommendation.

The proponent is encouraged to:

1. provide reasonable financial contributions to a social infrastructure fund in which industry funds are pooled to mitigate the impacts of major project developments in the Gladstone region and applied to the items listed on the *Gladstone Region Social Infrastructure – Voluntary Industry Contributions Framework*
2. participate and/or liaise with the Gladstone Foundation's Board of Advice to implement a structured process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Gladstone region are addressed
3. commit to an on-going investment in social facilities and services in the Gladstone region as a long-term member of the community.

Support for Social Infrastructure in the Western Downs/Maranoa region

The proponent's commitment to investment in social infrastructure in the Western Downs Region as outlined in its Community Investment Strategy has been noted as has the proponent's commitment to do this in collaboration with industry, government and the community. The proponent's willingness to guide investment in community services to this Plan is to be commended.



Coordinator General's conclusions

It is considered important that the LNG Projects proposed for the Maranoa/Western Downs region should contribute financially to social infrastructure in the Maranoa/Western Downs and so make the following recommendation.

The proponent is encouraged to:

1. provide reasonable financial contributions to a social infrastructure fund in which industry funds are pooled to mitigate the impacts of major project developments in the Maranoa/Western Downs region and for this to be done with input from APLNG's Maranoa and Western Downs RCCCs
2. participate as a member of a regional advisory group to implement a structured process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Maranoa/Western Downs are addressed
3. commit to an on-going investment in social facilities and services in the Maranoa/Western Downs region as a long-term member of the community.

The quantum of the contributions to social infrastructure referred to above requires further development and consultation between the proponent and government. Based on the information presented, it is noted that APLNG already intends to provide contributions to community facilities, services and networks in the Gladstone and Roma Surat region through implementation of its Community Investment Strategy and the Coordinator-General will consider these commitments when determining the 'reasonableness' of financial contributions to be provided to the pooled fund.

This will be informed by the outcomes of studies such as the SISP for the Gladstone region and similar studies for Roma Surat region. This will be part of the Surat Future Directions Statement and programs identified under the Queensland Government's Sustainable Resource Communities Policy.

6.2.8. Specific contributions to manage social impacts

Housing impacts

Previous Coordinator-General Reports for LNG projects have concluded that 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. And that the normal housing growth pattern only equates to the demand from a single project, not concurrent cumulative impacts of several projects. Nor should there be a sole reliance on housing market conditions for the Western Downs or Maranoa regions to respond and supply to the housing needs of workers and non-workers who wish to reside in these regions. This approach in other resource communities has had unintentional but adverse consequences on the availability of affordable housing for residents in those communities.

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, if the cumulative effects of pressure on housing demand of all projects happening close to the same timeframe, are to be avoided

In this way a substantial underpinning of supply should be provided to minimise the likelihood that cumulative impacts may develop and negatively impact the housing market. It is expected that each proponent should target the supply of 50 per cent of its own workforce housing requirements in the Gladstone region. It is considered that this will ease pressure, both for individual projects, and for the cumulative impacts of multiple projects. APLNG have estimated that approximately 5 per cent of the estimated 3 300 of the peak workforce, (170 workers and their families) could possibly relocate to Gladstone for the construction of the LNG Facility; may live in the FIFO; or choose to be housed in workforce accommodation on Curtis Island.



Even if all projects do not proceed concurrently the target of 50 per cent must remain for each project, as this will commence proponents on a path of being responsible for their own workforce housing requirements. However, APLNG's affordable housing solutions need to be informed by a range of factors to ensure it is responding appropriately to the needs of the community over the life of the project for both worker and non-worker accommodation. It is noted that these factors could include an analysis of the population, dwelling and household projections, housing tenure, dwelling stock, sales volumes and prices, housing demand and need by low and moderate income key workers. APLNG's mitigation strategies in the draft SIMP demonstrate the proponent's willingness to ensure its housing solutions are appropriate and enduring and it has been noted that APLNG has commenced work with such agencies as the ULDA, OESR, Department of Communities and councils in this respect.

Community and affordable housing will also be impacted by major housing changes in regional communities. The EIS indicated that there is a high probability that the project will impact housing supply and affordability through an increase in demand for accommodation by construction and operational workforces. It is noted that a number of EIS submissions received from the community, local, state and private submitters raised several issues regarding housing affordability, impacts on Indigenous and low income earners.

Impacts include increases in housing and/or rental prices caused by increased demand and limited supply resulting in poor levels of housing affordability and an over-inflated market and increased demand for hotel/motel accommodation presents challenges for competing local industry and businesses. The EIS found that house prices in Miles, increased on average by 28.6 per cent and the price for units in Biloela increased by 307.1 per cent in periods from 2004 to 2008. Since the 2006 census high rental rates have been experienced in Chinchilla and Roma of up to 55 per cent and 95 per cent respectively.

APLNG's workforce demonstrates the escalating but significant population growth the region will experience. In the gas fields, up to 2,100 workers will be required during the construction phase and APLNG has advised that the operational workforce is expected to peak of up to 700 in 2021. The gas pipeline will have a construction workforce of up to 800 which will reduce to approximately 20 operational staff.

For the LNG facility, the biggest construction workforce requirement occurs in 2013 and again in 2018 where up to 3,300 workers will be required. APLNG anticipates that up to 100 skilled workers will relocate to Gladstone for the operation of trains 1 and 2 and that these experienced operational workers will facilitate the up-skilling of the local workforce to operate trains 3 and 4. As well as the core operational workforce, up to 300–500 staff for scheduled maintenance shutdowns every few years will be required.

It has been noted that the proponent is currently developing in close consultation with key stakeholders, an Integrated Housing and Accommodation Strategy and Action Plan, which is to be finalised by the end of 2010. This will result in housing solutions for affordable, community and social housing in collaboration with partner agencies. The Integrated Housing and Accommodation Strategy will outline commitments and processes to:

- facilitate the creation of new permanent housing accommodation
- manage worker housing
- facilitate investment in affordable housing
- increase the capacity of community housing providers
- minimise impact on short-term accommodation.

Further development is required by the proponent to establish the strategies to help facilitate gas field operational staff (up to 700) who may wish to move out of temporary accommodation and settle into the community (presumably some with their families). The draft SIMP outlines that this will occur only when housing stock becomes available, however there is often a community desire to see operational staff to be either drawn from local regions or if workers are sourced from outside the region, they and their families should be provided with opportunities and incentives to settle permanently into the community. Clarification on how this will be achieved in APLNG's Housing and Accommodation Action Plan is required. Coupled with this aspiration, is a concern that TWAfs will become a permanent housing solution by proponents to house their operational staff.



APLNG has advised that the draft SIMP identifies that the Integrated Housing Accommodation Strategy will contain “Options to provide additional housing stock for part of re-locating operational workforce” and “Relocation and integration package for relocating workers and families”.

In order for the project to underpin supply, while using some local market arrangements, a strategy of 75 per cent supply of housing for new settlers in the gas fields would be appropriate, whether they be APLNG employees or contractor employees,.

It is therefore recommended that the final SIMP submitted for approval, should include details of the strategies and incentives the proponent intends to take to encourage operational gas and pipeline staff to become residents in the communities in which they work.

Coordinator-General’s conclusion

The proponent’s financial commitments to mitigate housing impacts is not available at the time of this Report. It is therefore recommended that the proponent enters into discussions with key stakeholders when this is known, to identify how CIS funding will be applied to housing and accommodation mitigation strategies. The outcomes of these discussions are to be reflected in the final SIMP submitted for the Coordinator-General’s approval.

It is recommended that APLNG’s financial contribution to housing and accommodation should be:

- consistent with the principles underlying the conditions imposed by the Coordinator-General in respect to the other LNG proponents (who have received project approval by the Coordinator-General) towards mitigation and management of housing impacts for Western Downs, Maranoa and Gladstone regions
- commensurate with the size and scale of the operation in comparison to other LNG proponents who have received Coordinator-General approval.

Condition 4, Appendix 1, Part 3, relating to the finalisation of APLNG’s Housing and Accommodation Strategy has been set to deal with the matters raised regarding housing issues for this project. It is expected that the Regional Community Consultative Committees (RCCCs) will provide the oversight of the how this strategy is delivering on its intended outcomes.

APLNG is to be commended for the initiative in developing an Integrated Housing and Accommodation Strategy and for the detailed consultation they have taken to date to inform the draft SIMP.

With regard to potential cumulative housing impacts, the proponent is required to contribute to updated data from its Integrated Housing and Accommodation Strategy to build a common government data set that describes the requirements for workers accommodation and other project related housing market impacts and informs strategy development.

The common data set will identify cumulative project related impacts and to support the development of evidence-based housing mitigation strategies to resolve project related cumulative housing impacts.

Employment, training and impacts on local business

Local employment and training

EIS Submissions and consultations raised the need for employment strategies and support programs that maximise employment opportunities for local disadvantaged job-seekers, under-employed people and Indigenous people. The Department of Education and Training stressed the importance of APLNG working in partnership with it on future workforce needs in the Surat Basin and in Gladstone regions through its comprehensive Workforce Development Plan.

APLNG’s Project Workforce and Training Strategy and Action Plan will target sectors of the community that are not currently participating in the labour force and to build local workforce capacity through training and development strategies to service the gas fields, gas pipeline area and the Gladstone region. Other actions in relation to employment and training include the following:

- working with Energy Skills Qld (ESQ) to conduct an assessment of existing community skills and offer targeted skills training to fill identified gaps



- working with government to target the employment of under-represented groups such as women, people with a disability and Indigenous Australians
- education and training—providing support for community based traineeships /apprenticeships and school based traineeships' including a specific Indigenous component to this action
- assisting job seekers with readily accessible information and advice
- establishing a centralised Job Referral Centre
- engaging with training organisations to increase the local skills capacity for employment during the construction phase of the project and in transition from construction to operations
- APLNG aims to source at least 20 per cent of the LNG facility construction workforce locally
- continuing engagement with the CSG/LNG industry through the CSG/LNG Skills Taskforce to develop awareness and training pathways for the industry
- continuing to work with the Queensland Minerals and Energy Academy (QMEA) to encourage career pathways into the CSG Industry to Gladstone.

Impacts of the project on local businesses

Migration of workers from local businesses to the project has been identified in the EIS and in submissions as an issue. Some submissions expressed the perception that there would be no local workforce employed by the project; or that the project would be poaching local skilled labour to the detriment of local businesses.

In addition to its Workforce and Training Strategy, APLNG will implement a Local Content Strategy including participation in, or establishment of programs which assist qualified local and regional businesses to tender for provision of goods and services for the project.

APLNG has advised it is committed to an Australian Industry Participation Plan. The Queensland Government Guidelines for developing Local Industry Participation Plans and Outcome Reports 2009 states that this will be equivalent to a Local Industry Participation Plan.

It is expected that a significant portion of the services required for an APLNG TWAF are anticipated to be drawn from the Gladstone economy. Interaction with the local economy is anticipated to be most prevalent on employees' days off. Workers will be able to access the local economy during this period with the expectation that ferry services would provide access to the mainland in the evenings, on occasion, and on worker's days off.

The Local Content Strategy will contain initiatives including:

- a local content policy aligned to the Australian Government's Australian Industry Participation Plan
- the implementation of the Australian Government Australian Industry Participation Plan to ensure that competitive local business be given full, fair and reasonable opportunities to participate in the project
- host procurement road-shows for potential suppliers providing advice regarding prequalification and involvement in the APLNG Project
- working with the Industry Capability to develop relationships with key business representative bodies and undertake consultation with members regarding opportunities for supply and capacity of local businesses
- develop processes to ensure local business opportunities are considered in Project procurement practises
- ongoing communication and promotion of project procurement requirements to ensure local businesses are aware of tender opportunities by providing regular project updates, overview of goods and services packages, supply chain and education to local suppliers.

Coordinator-General's conclusion

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

Issues raised in submissions during the EIS process in regard to potential impacts on the local employment market and local businesses in the region is acknowledged.



It is recommended that APLNG's Project Workforce and Training Strategy for the gas fields, gas pipeline area and the Gladstone region includes:

- support and job opportunities to vulnerable groups in the community including being culturally responsive to cultural needs
- equal employment opportunities to the community and to adopt employment strategies which support local employment
- that where there are identified skills gaps, the proponent is to provide a strategy, in consultation with the Department of Education and Training, which demonstrates how the proponent will contribute to the effective acquisition of skilled labour and/or training and a job referral service that makes available information on positions vacant in local businesses with similar trade/skills requirements and to integrate it with the proponent's own recruitment service, so applicants can choose from local or project employment prospects
- ensure that the proponent works with QMI who work with businesses by fostering innovation in Queensland businesses and is linked to the broader network of Queensland Government industry
- report 6 monthly to the respective Regional Community Consultative Committees (RCCCs) on the arrangements for the job referral service
- if it is not feasible to set up or continue operating a job referral service, prior to closing the service the proponent is to make alternative arrangements, as agreed with the RCCC.

It is recommended that proponent must, within three months of the project receiving Final Investment Decision implement the Local Content Strategy as per the proponent's draft SIMP, ensuring that:

- it is for the life of the project
- it is consistent with the principles of the Australian Industry Participation Plan. The Queensland Government Guidelines for developing Local Industry Participation Plans and Outcome Reports 2009 states that this will be equivalent to a Local Industry Participation Plan
- potential local suppliers are provided with information in an equitable and timely manner
- local businesses are able to bid on potential contracts, and communicate project requirements
- it considers strategies and adopt procurement strategies to maximise local participation
- local firms are provided with opportunities to supply under the same terms, standards and conditions as interstate or overseas businesses
- contracts are awarded on the basis of the best overall value, which includes due consideration of non-cost factors such as reliability, maintainability, servicing requirements
- is linked to the SIMP, community investment strategy priorities to help mitigate against the loss of skills to the LNG industry.

The Local Content Strategy is required to report on or provide not less than six monthly progress reports to the four RCCCs.

The proponent is to be commended for:

- its comprehensive Project Workforce and Training Strategy and Action Plan
- a Local Content Strategy
- willingness to integrate conditions previously imposed in previous LNG Coordinator-General reports such as the establishment of Job Referral Centres.

The issues raised in EIS submissions are expected to be adequately addressed by the proponent during its negotiations with stakeholders as it finalises SIMP strategies. It is therefore recommended that the proponent finalises the SIMP in consultation with key stakeholders as outlined in the action plan and submits this for the Coordinator-General's approval.

Community services

The proponent has undertaken extensive consultation as part of the EIS and with subsequent consultations with key stakeholders including government agencies, councils and non-government service providers to identify the impacts on community services and the mitigation strategies to address these.

The APLNG has advised that the Community Investment Strategy will be developed to mitigate against these social impacts by contributing to social infrastructure, partnerships, sponsorships and donations, and employee giving and volunteering. The Community Investment Strategy and Action Plan will invest in social infrastructure, target community capacity building and strengthen existing and



new programs and services as required. It will also establish partnerships, sponsorships and donations program plus an employee giving and volunteering framework.

Social infrastructure and community services

The proponent has identified that social infrastructure may be affected due to:

- an increase in demand on community services and facilities, including:
 - medical and health services
 - child care services and those suited to a range of working hours
 - family support services especially for vulnerable young people
 - access to disability support
 - increased demand on affordable housing
 - incremental increased demand on community and cultural facilities such as libraries, parks, community centres and sporting grounds
 - an increased demand for education—local school enrolments.

The proponent has developed a holistic approach to addressing impacts on social infrastructure that combines direct investment through its Community Investment Strategy and the implementation the Housing and Accommodation Strategy, Workforce and Training Strategy, Indigenous Engagement Strategy and a Local Content Strategy to help mitigate and manage the impact on social infrastructure. The proponent has indicated that investment into social investment will be guided by its participation in any social infrastructure frameworks developed by Government.

In addition the application of the Community Investment Strategy will invest in social infrastructure, target community capacity building and strengthen existing and new programs and services as required.

Community medical and health services

The proponent has identified a number of potential impacts on community health and safety during project construction and operational phases. These include:

- potential change in the perception of community safety due to an imbalance in the single male population and the potential for socially unacceptable behaviour
- increased demand on medical and health services
- concern about potential impacts of industry on health, with the main concern being air quality and dust
- increased road traffic reducing road safety and causing traffic congestion.

APLNG will provide first response medical services at Curtis Island and will engage emergency service and Queensland Health in this process. The Community Health and Safety Strategy will assist in demand management on medical and health services. The Community Health and Safety Strategy will incorporate Traffic Management Plans.

The Community Health and Safety Strategy will assist in identifying opportunities through local communities and emergency service providers to alleviate any potential increased demand to medical and health services. The Community Investment Strategy will outline how APLNG will collaborate with community support service providers and the community to develop programs that assist in building capacity within support services and alleviating demand associated with the proponent's project.

The TWAF Code of Conduct and Project Rules will further be strictly enforced. The Code of Conduct and Project Rules extend to cover inappropriate behaviour in the community which can be directly attributed to APLNG employees and contractors.

Emergency and police services

EIS submissions raised issues dealing with the need for emergency, and disaster planning and response needs to be done in consultation with members of the Gladstone Regional Council's Local Disaster Management Group. It was also noted that the demand on emergency and police services may stretch existing services and emergency and police services are particularly interested in knowing how these impacts will be addressed. The need for housing to remain affordable for non-resource workers (i.e. police) in Gladstone is of particular note to the Queensland Police Service.



Through the proponents Community Investment Strategy and the Integrated Housing and Accommodation Strategy, the proponent has identified that it intends to work with agencies, councils and the community to look at ways APLNG can mitigate and manage the demands and impacts on emergency and policing services associated with the project.

In terms of the emergency and policing matters the proponent is committed to:

- minimising the demand on health and emergency services
- addressing the impacts of road, air and shipping movements of Project personnel, materials and equipment
- providing a safe environment for APLNG employees and community members.

To achieve these objectives, a Community Health and Safety Strategy and Action Plan will be developed in both draft SIMPs and will consist of the following key initiatives:

- undertake Emergency Response Planning for construction and operations in collaboration with emergency service providers and neighbours
- provide first emergency response resources to site at Curtis Island
- provision of workforce numbers and traffic movements to local and state government to assist with infrastructure planning and discussion regarding APLNG's commitment to traffic management and health and safety initiatives
- expand Community Safety Awareness Program in conjunction with industry partners government and community groups to develop responses to community safety concerns in the region
- develop community complaint and grievance mechanism.

Coordinator-General's conclusion

EIS submissions from advisory agencies relating to potential increased demands on social infrastructure and community services, community medical and health services and emergency and police services raised many pertinent issues..

Sections 6.2.5.3 and 6.2.5.4 of the EIS deal with funding for social infrastructure by encouraging participation in the draft Gladstone Region Social Infrastructure - Voluntary Industry Contributions Framework in Gladstone and the Maranoa/Western Downs. Conditions have also been imposed regarding the proponents Community Investment Strategy in sections 6.2.5.2 and 6.2.6.1 of the EIS.

While the draft SIMP has clearly been developed in consultation with a wide range of stakeholders there are current limitations on the proponent to be specific about levels of investment it will attach to some of the initiatives; once the Community Investment Strategy is final, however, APLNG must engage with its stakeholders appropriately to obtain agreement on how the strategies relying on CIS can be delivered.

Gaps identified by agencies in the draft SIMP must be addressed in the final version submitted for approval. In this regard, the following specific issues raised in submissions in the final SIMP must be submitted for approval.

The proponent must implement the Community Health and Safety Strategy ensuring that:

- it finalises emergency response planning with the stakeholders (identified in the draft SIMP including Councils, QPS and DCS) that defines roles and responsibilities in incident command and investigation and includes all stakeholders in the Emergency Response Exercises
- the impacts to traffic, transport and emergency services are mitigated as per the draft SIMP in consultation and negotiation with key stakeholders listed
- prior to the construction of workers' accommodation, provide to Queensland Ambulance Service information on site access to allow planning for effective service delivery
- work with Queensland Ambulance Service to monitor case loads and develop any joint mitigation planning and implementation strategies if the project has placed a strain on existing services
- site level orientation of all APLNG's LNG facility components (construction and operations) for local emergency services is provided to key Emergency Services stakeholders including:
 - the Area Director, Gladstone, Department of Emergency Services
 - the Local Controller; and



- State Emergency Services Group Leaders of the Gladstone Area
- strong workforce health and safety rules and protocols, including codes of conduct and wellbeing programs are provided for workers.

The proponent must ensure that Queensland Health (QH) is involved in APLNG's strategies regarding public health and safety including:

- strategies addressing the capacity of health services to meet the expected demand for medical and emergency services
- that QH is a key stakeholder consulted in the APLNG's revised Community Engagement Strategy as outline in Condition 1.a, Appendix 1, Part 3 of this Report (relates to noise, vibration, hazard and risk activities to people, property and the environment of abnormal events, natural hazards or accidents)
- investment into health and community services is done in accordance with the proponent's draft Community Investment Strategy and is reflected in the final SIMP submitted for the Coordinator-General's approval and in accordance with Condition 3, Appendix 1, Part 3.

It is recommended that the Community Health and Safety Strategy is to be reviewed on a six monthly basis for the initial two years and then annually or as necessary in consultation with key stakeholders including RCCCs, Councils, QH, Queensland Police Service (QPS) and the Department of Community Safety.

The proponent must demonstrate through the Community Investment Strategy, Community Health and Safety Strategy and the Housing and Accommodation Strategy that:

- QPS is involved in the planning and development response associated with impacts of the APLNG project including the potential impacts as a result of increased commitment and road safety priorities in the affected areas. This involvement is to extend to the development of the proponent's Integrated Housing and Accommodation Strategy
- QPS will continue to be involved on in incidents and complaints management regarding traffic and transport movements including the movement of oversized vehicles and increased vessel activity in the Gladstone Port Area

Conditions 1 and 2, Appendix 1, Part 3 of this report relate to finalising the SIMP.

6.3. Greenhouse gases

The APLNG proposal is one of several large scale LNG developments that would source CSG from the Surat Basin. At peak production this proposal will export 18 Mtpa CSG from Curtis Island at Gladstone. The project life will be at least 30 years.

The EIS provided a 'footprint' for the project, as a whole and this approach has identified the total emissions within the concise framework of the project. Externalities are also generally included up to the point where the LNG emission responsibility is transferred to bulk LNG carriers.

Greenhouse gas (GHG) emissions are framed in Table 6.2.



Table 6.2—Project footprint—GHG Emissions

Gas Field inventory	Pipeline Inventory	LNG Plant Inventory	End User Emissions
<ul style="list-style-type: none"> • <u>Scope 1 and Scope 2</u> • Land clearing • CSG extraction • Gas processing • Water treatment • Gas flaring 	<ul style="list-style-type: none"> • <u>Scope 1 and Scope 2</u> • Land clearing • Pipeline construction 	<ul style="list-style-type: none"> • <u>Scope 1 and Scope 2</u> • Land clearing • LNG plant construction • Power generation for compression and refrigeration using CSG 	<ul style="list-style-type: none"> • <u>Scope 1 and Scope 2</u> • Bulk loading • LNG re-gasification • LNG pipeline • LNG combustion
<ul style="list-style-type: none"> • <u>Scope 3 emissions</u> • Diesel consumption • 3rd party transport • Embedded energy 	<ul style="list-style-type: none"> • <u>Scope 3 emissions</u> • Diesel consumption • 3rd party transport • Workforce accommodation • Embedded energy 	<ul style="list-style-type: none"> • <u>Scope 3 emissions</u> • Diesel consumption • 3rd party transport • Embedded energy • Workforce accommodation. • Workforce transport 	
CSG from other gas fields <ul style="list-style-type: none"> • CSG extraction • Gas processing 			

- Scope 1** — direct emissions arising from fugitive emissions and land clearing
- Scope 2** — indirect emissions arising from purchase of electricity, and steam and heat
- Scope 3** — indirect emissions arising from sources outside of the scope of the report, such as embedded energy in purchased fuels and construction raw materials.

The quantities of GHG emissions are referred to in terms of carbon dioxide equivalents or CO₂-e.

Gas field GHG emissions

The EIS stated that peak GHG emissions from the gas field will occur in the period 2021–2024 and this peak equates to 3.3 million tonnes CO₂-e per year. Other GHG emissions from the gas field development and operation would be insignificant by comparison (Scope 2 emissions would offset some of the diesel sourced emissions in the Scope 1 assessment and Scope 3 emissions would average out at 0.01 million tonnes CO₂-e per year)⁸.

The maximum total emissions from the gas field would approximate 3.3 million tonnes CO₂-e per year.

The proponent’s decision stated in the Supplementary documentation to make use of the Powerlink electricity grid for gas field GPF rather than off-grid CSG powered electricity generation, would reduced GHG generation.

Pipeline GHG emissions

Scope 1 GHG emissions will also be produced from clearing of vegetation during the construction phase. During the operational phase, Scope 1 GHG emissions will arise from fugitive emissions from the gas pipeline. The total Scope 1 and 3 GHG emissions over the life of the project is 925,000 tonnes CO₂-e including 0.005 million tonnes CO₂-e during the operational phase⁹.

LNG facility GHG emissions

During 4-train operations, the peak Scope 1 GHG emissions from the LNG plant are projected to be approximately 5.54 million tonnes CO₂-e per year¹⁰.

⁸ EIS: Volume 3, Chapter 24, Section 24.14.2
⁹ EIS: Volume 3, Chapter 24, Section 24.13.2
¹⁰ EIS: Volume 4, Chapter 24, Section 24.13.2



Cumulative considerations

While the APLNG project would result in modest increases in the Australia's GHG emissions inventory, the cumulative effect of all the currently proposed CSG/LNG developments could represent some 39 million tonnes CO₂-e per year—some 6.5 per cent of the 2007 emission benchmark for Australia¹¹. The life of this project is likely to be 30 years whereas other CSG/LNG proposals could have operations over 20 to 25 years.

Justification for CSG/LNG development on such a massive scale has been cast in the potential for CSG to displace large volumes of GHG emissions from coal-fired electricity generation.

Coal-fired power stations in Australia emit around 190 million tonnes of GHG, which is 39 per cent of Australia's total emissions. However, Australia's historical commitment to coal also implies easy and cost-effective access to the resource, embedded investment in coal-burning technology and commitment to clean coal research and development, such that a move to displace coal as the fuel of choice could take a very long time.

A more likely scenario could be to align new or replacement power stations to CSG and the timeline for Australia to reduce its emissions in such a scenario might be greater than the life of the CSG development program.

Instead, there is potential for creating the offsets in those nations grappling with rapid expansion of industrialisation. Marketing LNG to overseas users therefore has the same effect of coal displacement provided that costs, availability and security of supply are equivalent or better than for coal.

Thus, in considering the GHG emissions from the project and from other planned CSG/LNG proposals, there is cumulative potential for net displacement of coal-fired power generation equivalent to about 190 million tonnes CO₂-e per year.

6.3.1. Legislation and policy considerations

Australian Government

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. Under the agreement, Australia has agreed to cut GHG emissions during the period 2008-2012 to 108 per cent of the levels they were in 1990 (i.e. eight per cent more than they were in 1990).¹²

In addition, 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 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 2020.¹³

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 projections¹⁴ 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.

¹¹ EIS: Volume 5, Chapter 31, Section 8

¹² Source: Australian Government Department of Climate Change and Energy Efficiency
<http://www.climatechange.gov.au/en/government/national-targets.aspx>

¹² Australian Government Department of Climate Change and Energy Efficiency
<http://www.climatechange.gov.au/en/government/national-targets.aspx>

¹² 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>

¹³ Australian Government Department of Climate Change and Energy Efficiency
<http://www.climatechange.gov.au/en/government/national-targets.aspx>

¹⁴ 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.



Importantly however, the Department of Climate Change projections do not appear to include the Queensland CSG LNG industry. The report states¹⁵ 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 Fugitive¹⁶ emissions.” However, based on the information presented in the EIS for this project, the emerging Queensland CSG LNG industry will significantly increase previous projections of GHG emissions from the Australian oil and gas sub-sector.

Queensland

The administering authority under the 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, 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, 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).

6.3.2. Coordinator-General’s assessment and conclusions

The EIS documentation on GHG has been reviewed and the methodology for assessment and the outline of management processes to minimise the generation of GHG emissions has been accepted.

When used for power generation, LNG delivered from Queensland to China and used to generate power could produce approximately 35 per cent less greenhouse gas emissions than coal. However, it is acknowledged that coal-fired power generation is continuing.

In an effort to mitigate the carbon footprint of both the construction and operation of this project, Condition 3 Appendix 1 part 1 has been set, 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 for approval within three months of the granting of the petroleum facilities licence for the LNG facility.

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

¹⁵ 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.

¹⁶ 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)



6.4. Cumulative impacts

6.4.1. Introduction to cumulative impacts

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:

- there must be some proximity in time and /or location for projects to interact
- there must be a mechanism or opportunity for the interaction
- the assessment must identify an impact different from or additional to the sum of the collective projects
- mitigation requirements 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.

Cumulative impact information concerning the three LNG projects dealt with pursuant to section 35 of the SDPWO Act has been presented in the relevant EIS documentation. Each EIS produced an assessment of cumulative impacts in response to the same TOR. With this background the cumulative effects have been evaluated and, together with advice from agencies and other submissions, conclusions on the potential for cumulative impacts from the APLNG project have been assessed..

Several of the matters considered in the following cumulative impact sections cannot be holistically considered, simply because the quality of data available to the proponents has not been suitable for quantitative assessment. Notwithstanding, all proponents have provided qualitative assessments that have been taken into account in the following sections.

There is considerable potential for cumulative effects to be mitigated simply by proponents addressing issues conjunctively. A case in point is the CSG pipeline crossing at The Narrows. If agreement between all parties is reached on implementation of the bundled pipe solution, then it is likely that the potential impact of the pipeline on the marine ecology would be low (as assessed by APLNG). On the other hand, if all parties do not reach agreement the cumulative impact will increase.

There are several other significant matters on which a cumulative impacts assessment approach is already being progressed, for instance, groundwater modelling and monitoring and the discharge of treated CSG water to the Condamine River system. Additionally, the government is implementing strategies and plans to identify cumulative impacts for social and economic issues in the Surat Basin and in the Gladstone region.

The Coordinator-General's report on the EIS for the Queensland Curtis LNG project, stated that a CSG Industry Monitoring Group (CIMG) will be established and requiring the proponent to assist in the establishment and funding of the group and participation in its activities. The CIMG will be chaired by the Coordinator-General or a delegate.

The objective of the CIMG is to assess and report on the cumulative environmental and social impacts of the CSG Industry and its activities.



More specifically the objectives of the group include, to:

- review project environmental and social impacts and interactions between proponents
- review monitoring data for cumulative environmental impact implications for all proponents
- respond to community concerns and identify issues where proponents and relevant agencies can take action to manage impacts
- recommend changes to legislation, policies and guidelines to address emerging issues from the CSG and LNG industry.

6.4.2. Analysis of LNG projects EIS reports

The Coordinator-General's report on the QCLNG proposal included the following summary table to demonstrate how different proponents had approached the issue of cumulative impact.

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

Proponent	<i>GLNG</i>	<i>QCLNG</i>	<i>APLNG</i> ¹⁷
-Gas Field	6 projects	11 projects	27 projects
- Pipeline	14	11	27
- LNG Plant	12	11	15
Other LNG projects compared	QGC APLNG partly, Arrow pipeline	GLNG	GLNG, QGC, 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. LNG projects overlapping in time and location with the proponent's project are most likely to have cumulative impacts.

The above lists have been reviewed and it is considered 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 Arrow CSG Australia Ltd project, which was not formulated until almost at the end of the EIS report period, hence was not predicted in APLNG's analysis.

6.4.3. Gas fields cumulative impact assessment

Issues of concern

For the reasons expressed above an analysis has been undertaken to compare a range of aspects dealt with in the respective EIS' for the three significant LNG projects..

Hence Table 6.4 was created from the EIS reports now published by the LNG proponents. Ratings (e.g. medium, moderate, low, minor, high) are as specified by the respective report.

¹⁷ APLNG EIS Vol2, Table 25.1



Table 6.4—Gas fields cumulative impact assessment summary

Aspect	GLNG	QCLNG	APLNG
Land/ Soils	Low	Minor	Moderate
Land Use	Medium	Moderate	
Land Contamination		Minor	
Terrestrial Ecology	Low	Moderate	Moderate
Aquatic Ecology	Medium	Moderate	Moderate
Marine Ecology	-	-	-
Surface Water	Low	Minor	Moderate
Groundwater	Medium	Considerable	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	Minor to Moderate	Moderate
Visual Amenity	Low	Moderate	Moderate
Cultural Heritage	Low		Low
Hazard and Risk	Low	Minor	Low

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

Terrestrial ecology

APLNG assesses its terrestrial ecology interaction impacts as low to moderate because it considers that most flora populations are well represented elsewhere. The major ones are brigalow, and semi evergreen vine thicket, for which the APLNG project claim to account for clearing of 4.36 per cent and 0.29 per cent respectively of these communities in the bioregion. APLNG indicates that its total clearing footprint will only take about 2.8 per cent of the remnant vegetation 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.

Overlaps of threatened species between projects will be moderated by the normal project mitigation strategies of avoidance, minimisation and offsetting. However information in the QCLNG and APLNG EIS reports does indicate that the extent of habitat of three threatened flora species *Homopholis belsonii*, *Micormyrtus patula* and *Philotheca sporadica* may overlap areas of most gas fields and pipelines, and that the species have populations which are concentrated in these development areas. Hence there is potential for some cumulative effects on these threatened species, warranting specific management arrangements.

Groundwater

CSG producers have the right to take associated water under the P&G Act as a necessary activity in the process of extracting CSG. At the same time the CSG producers have responsibilities to manage the effects of CSG de-watering (water being a by-product of CSG extraction).

There are two key issues arising from the extraction of CSG water:

- effects on other aquifers above and below the coal measures when the coal seam aquifer is drawn-down to de-water the gas field
- management consequences of CSG water treatment.



Drawdown effects

Ground water modelling undertaken for the EIS considered all major CSG proposals¹⁸ concluding that the combined effect on the extent of ground water drawdown in the Walloon coal measures and in the overlying and underlying strata would expand. The magnitude of the increase in the simulations of cumulative activities was of the same order as that for the 'project case'. Accepting the modelled impacts to be correct, the effects on ground water in the Walloon Coal Measures are likely to be widespread and long-term (in the order of 200 years).

While water quality in the coal seams themselves is generally poor, Coal seam aquifers are used for stock and domestic water supplies. The overlying and underlying aquifers, however, are important aquifers. These overlying and underlying aquifers are not targeted for gas extraction, although they may be indirectly impacted to some extent by extraction of water from coal seams.

CSG operators have an obligation to 'make good' the impacts of their water extraction on existing water users. In future, the CSG producers will also be responsible for making good impacts on new bores and springs.

If aquifers in the measures above the Walloon coal measures are excessively drawn down as a result of CSG dewatering activities, the CSG operators may have to provide alternative water supplies to landholders and enterprises relying on those aquifers. In this regard, DERM has developed a guideline. New provisions of the *Water Act 2000* apply to current and future projects and require evaluation and strict management of impacts of water extraction from the CSG process on bores, aquifers and springs.

New 'trigger thresholds' must be used to investigate individual CSG operators' impacts on bore water supplies. Trigger thresholds are:

- 5-metre drop for consolidated aquifers, such as sandstone
- 2-metre drop for shallow alluvial aquifers
- 0.2-metre drop for springs, including watercourses connected to springs.

If a bore owner believes CSG water extraction has caused a decline in their bore water levels in excess of the trigger value, the CSG producer will be obliged to negotiate ['make good' arrangements](#) with the bore owner, under the 'make good' provisions of the new regulations.

Where the water level impacts of CSG producers overlap, the government will establish a cumulative management area.

Within a cumulative management area, the Queensland Water Commission (QWC) will be responsible for managing activities like groundwater impact monitoring, modelling and preparing cumulative impact reports.

Managing CSG water treatment

CSG operators must operate water treatment facilities and manage the products/outputs in accordance with the environmental authority (EA) for their activities. While the Queensland Government favours recharge of aquifers as the highest priority and all CSG operators are conducting aquifer injection trials, opportunities for beneficial use of permeate in commercial operations are attractive propositions.

Management of permeate in most situations will require large 'balancing' storages to match production with beneficial use demands or in cases where discharge to surface or ground water is authorised, environmental and hydrological capacity. Consideration should also be given to the implications of several CSG operators using the same aquifers or watercourses when designing balancing storages.

APLNG has noted in the EIS that the cumulative volume of brine accumulated by all CSG producers represents a significant risk to environmental values in the region, which will require careful and coordinated management to reduce this risk to an acceptable level.

¹⁸ EIS Volume 2, Chapter 10, Section 10.4 and Volume 5, Attachment 21



A measure of the importance of this is reflected in government policy development that has occurred. The policy covers use of CSG water, evaporation dams, design standards for CSG water aggregation and brine dams transitional arrangements for existing dams and management of saline effluent and solid salt wastes from water treatment and evaporation processes.

DERM is to address such issues within the ambit of the Coal Seam Gas Water Feasibility Study¹⁹. The Study seeks to analyse opportunities for, and risks and practicality of, using CSG water to assist in achieving the long-term goals of the Queensland section of the Murray Darling Basin of transitioning irrigation communities to lower water use and securing the viability of ecological assets.

6.4.4. Pipeline cumulative impact assessment

Issues of concern

The EIS stated that the APLNG project would cause similar impacts to other LNG developments, resulting from construction and operation of project related work-sites and structures.

For the reasons expressed in the introduction, analysis has been done of how the three LNG significant projects assessed the range of aspects considered. Hence Table 6.5 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	Medium ²⁰
Land Use	Low	Negligible	Low
Land Contamination		Negligible	Low
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
Aspect	GLNG	QGC	APLNG
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 proponent

The APLNG EIS assessed Traffic and Transport impacts as moderate. The EIS considered the potential for rail transport from Gladstone as a way of minimising congestion in the vicinity of Gladstone and the supplementary information provided by the proponent confirmed rail to Biloela is the preferred transport system for primary lay-down, followed by road transport to laydown areas identified as:

- Laydown No. 1: Miles

¹⁹ DERM: <http://www.derm.qld.gov.au/factsheets/pdf/water/w184.pdf>

²⁰ EIS: Volume 2, Chapter 25, Section 25.2.2 stated that loss of good quality agricultural land is a potentially significant cumulative impact



- Laydown No. 2: Wandoan
- Laydown No. 3: 10 kilometres north-east of Theodore
- Laydown No. 4: halfway between Biloela and Gladstone
- Laydown No. 5: Mt Larcom.

The supplementary assessment confirmed that wherever possible, road transport from Biloela could be undertaken along the right of way (ROW), further reducing the cumulative traffic impacts.

While the previous section highlighted the potential for activities on adjacent gas field tenements to have cumulative impacts, laying pipelines has the potential to cause significant disturbance, although the cumulative effect is likely to be limited to the physical scale of the disturbance.

The EIS and supplementary information indicated that the pipeline route will initially follow the Surat-Gladstone pipeline route, deviating from it east of Theodore and joining the GLNG pipeline route north-west of Biloela. For the remainder of the route the pipeline will be located within the Callide Infrastructure Corridor State Development Area (CICSDA).

In this regard, the areal extent of some of the potential impacts could be cumulative and in the APLNG supplementary information the proponent has advised that a workshop had been held with other CSG proponents to identify opportunities where sharing and reuse of facilities would be possible.

The EIS assessed an option for the pipeline crossing The Narrows by directionally drilling under the seabed. Supplementary information from the proponent stated that the directional dredging proposal had been assessed and found the directional drilling proposal would not be feasible over such a long distance across the Narrows. The alternative single pipeline crossing under consideration would be an open cut trench using a cutter suction dredge. Once the assembled pipeline was laid in the trench, rock armour would be placed on top of the pipeline to protect it from accidental damage.

In parallel with the single pipeline option there has been a concerted effort to consider a “bundled” pipeline crossing trenching and laying of all the current CSG proponent pipelines across The Narrows to minimise the overall cumulative effects on the marine environment. The proponent strongly favours the bundled solution as a primary mechanism to limit potential risks to marine ecology.

If agreement cannot be achieved between all parties to a bundled pipeline solution for The Narrows crossing, each proponent would be required to fully assess the environmental impact of individual crossings and the issue of cumulative impact could significantly impact on marine environmental values.

Coordinator General’s conclusion

Co-location of pipelines

Construction of the upstream component of the gas trunkline is independent of any of the other CSG developments; thus it is unlikely that there would be cumulative impacts on land or land use. There is, however some potential for vegetation clearing to have a cumulative effect on terrestrial flora and faunal habitat, if proposed safeguards are not instituted. In this regard the proponent has identified mechanisms to minimise risks, particularly in regard to remnant and endangered vegetation.

For the last 40 kilometres of the pipeline route to Gladstone, all pipelines traverse the Callide Infrastructure Corridor (CIC) which has been designated by the government as a State Development Area for the purpose of co-locating pipelines. 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/occupiers and proponents. It more efficiently assesses and optimises the cumulative impacts of land disturbance with multiple proponents and landholders/occupiers.

Marine ecology

As stated above, the activities originally proposed for the pipeline crossing The Narrows to Curtis Island are being assessed separately as a coordinated (‘bundled’) approach to mitigate the potentially significant impacts in this environmentally sensitive area.



The bundled pipeline option is favoured, because of the potential reduction in cumulative impact on the marine environment at The Narrows. However, it is recognised that scheduling of construction operations and legal rights associated with each company occupying the specified pipeline corridor could cause difficulties..

Transport

Cumulative impacts could occur through co-location of pipelines in the CICSDA. However, the proponent's decision to rail the pipes to Biloela could enhance opportunities to plan traffic movements without the liability of dealing with the cumulative density of Gladstone's industrial traffic. Further, the proponent's undertaking to utilise the ROW, wherever possible and to avoid use of public roads has potential to minimise the cumulative effects on road pavements, bridges, intersections and reduce the likelihood of accidents.

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. However, there is significant potential for cumulative effects to be reduced by using rail transport to move the pipes away from Gladstone to Biloela..

Studies done by proponents in their EIS' are considered to be 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. The value of the decision taken by APLNG to minimise interaction with the other LNG proponents by adopting rail and "off-road" solutions to deliver the pipes to Laydown areas is recognised.

Therefore Condition 8, Appendix 1, Part 1 has been included to require confirmation of the proponent's commitment to this course of action and to any residual requirements to participate in and implement the findings of a cumulative road impacts study which will take into account all CSG/LNG and other project related transport impacts for servicing the pipeline corridor in the Gladstone region as well as in the Surat region.

6.4.5. LNG plant cumulative impact assessment

Issues of concern

For the reasons expressed above in the introduction, an analysis has been done of how three similar LNG significant projects assessed the range of aspects considered. Hence, Table 6.6 was created from the EIS reports now published by the LNG proponents.



Table 6.6—LNG plant cumulative impact assessment summary

Aspect	GLNG	QGC	APLNG
Land/ Soils	Medium	Minor	Low
Land Use	Low	Minor	-
Land Contamination	Medium	Negligible	Low
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

Table 6.6 indicates that cumulative impacts will be mostly present in respect of Marine Ecology, Social and Community, and Traffic and Transport.

Marine ecology

Marine ecology effects are stated by all proponents as high impact. This reflects the inclusion of shipping channels, swing basin and berth dredging in each proponent's assessment. It is indeed true that if each project undertook its own dredging, impacts might be heightened by the potential for simultaneous coastal and dredging works, resulting in 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 Ports 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.

The Western Basin dredging proposal did not include all of the marine impact areas associated with the terminal development at the APLNG site. In this regard APLNG also proposes to improve shipping access to shoreline facilities, resulting in an estimated 900,000 m³ of dredge spoil that will be used to reclaim some tidal and low-lying areas on the APLNG site. This matter is discussed further in section 9.4 of this report.

Cumulative impact studies are reported in the APLNG EIS and supplementary information for the following:

- hydrodynamics of full Western Basin Dredging and Disposal Project, including QGC, Wiggins Island Coal Terminal, and GLNG projects on Port Curtis
- effluent discharge of QGC brine, and treated sewage from the peak workforce
- air emissions of QGC, GLNG and two small LNG projects.

An assessment of cumulative impacts on the marine environment of the Port Curtis western basin was undertaken as part of the Coordinator-General's evaluation of the Western Basin Dredging and Disposal Project. The APLNG EIS and supplementary material is considered to be adequate and no additional recommendations for management of cumulative impacts on the marine environment are required.



Coordinator-General's conclusion

In respect to social and community issues, it is likely that there would be limited potential to house the construction workforce in existing and planned housing on the mainland at Gladstone. All of the LNG proponents appear to have concluded that stand-alone accommodation for workers on Curtis Island could provide a more effective solution during the development phase of the LNG facilities. It has therefore been necessary to review the scale of the potential worker accommodation on Curtis Island:

- subsequent to the EIS APLNG²¹ has advised that it is intended to expand the worker accommodation layout on Curtis Island from 2,100 (EIS) to an initial peak of 2,600 in 2013 and a second peak of 3,300 for trains 3 and 4 in 2018.
- the QCLNG SEIS²² identified a need to house 2,000 workers on Curtis Island during the peak construction period. This would appear to be about month 38 of the LNG plant development
- the GLNG SEIS²³ identified a need to accommodate about 1,530 workers on Curtis Island
- the proposed Shell LNG facility would also be of around the same scale and could require accommodation for up to 3,000 workers on Curtis Island during the construction period²⁴.

Regarding the cumulative effects associated with such a large resident workforce on Curtis Island (between 8,600 and 10,000 workers) it is anticipated that there could be impacts on social and community values and also on resource inputs and on infrastructure management. However, these Curtis Island population projections should be considered as a worst case and, in fact, the LNG developments are unlikely to have coincident peaks in accommodation requirements, due to outside influences on commencement.

Each LNG facility is proposed to operate as a largely self-contained entity. This implies a risk of inefficiency in the provision of energy generation, water purification, resource recovery and recycling, waste treatment and passenger transport to and from the Island and it is concluded that the scale of impact could be minimised by development of common services. In this regard, it is recommended that all proponents should aim to:

- identify and assess opportunities to prevent potential duplication of power supplies
- identify opportunities for integration of water treatment and waste management facilities, including recycling and re-use of waste products
- avoid unnecessary construction activities brought about by having stand-alone services
- minimise unnecessary transport movements by developing/supporting integrated ferry services for workers and for food and other stores required on Curtis Island.

Social impact

The Social Impact Management Plan considers other aspects of the cumulative effects of the proposed worker accommodation requirements on Curtis Island and considers the matters raised by the Gladstone Regional Council.

Elsewhere in this report, in the Social Impact section, conditions have been set 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. It is envisaged that the Regional Community Consultative Committee (recommend be set up at each major population region) can provide input on 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, 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.

This arrangement is intended to be highly adaptive and responsive to community conditions, as a formal consultative group, on which the regional council is represented, have access to the latest information on both supply and, demand for housing in the region. Hence, it should be adopted by the proponents as a practical way in which cumulative housing factors may be managed.

²¹ APLNG Supplemental information to the EIS – Project Description Improvements August 2010, Section 5.7

²² QCLNG SEIS Volume 8 Chapter 6, Section 6.2.2.4

²³ GLNG SEIS Social supplement, November 2009, Section 1.2

²⁴ Shell Initial advice statement, May 2009. Section 2.4



Transport

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, a proposal has been initiated that DIP, in conjunction with DTMR, should conduct a Road Transport Infrastructure Cumulative Impacts Study – Proposed LNG Industry Impacts. Contributions are being sought 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. A condition to this effect in the transport section of this report.

6.5. Offsets

6.5.1. Environmental offsets—regulatory framework

An environmental offset is an action taken to counterbalance unavoidable, negative environmental impacts that result from an activity or a development.

The Queensland Government Environmental Offsets Policy 2008 (QGEOP) outlines the overall direction and framework for environmental offsets in Queensland. Under the principles of the policy:

- offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy
- environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact
- offsets must achieve an equivalent or better environmental outcome
- offsets must provide environmental values as similar as possible to those being lost
- offset provision should minimise the time-lag between the impact and delivery of the offset
- offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values
- offsets must be legally secured for the duration of the offset requirement.

Under the framework of the QGEOP, there are currently three offsets policies that address specific environmental issues. The specific-issue offsets policies, and their regulating agencies are:

- Policy for Vegetation Management Offsets, 2009, DERM;
- Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss, 2002, DEEDI
- Draft Policy for Biodiversity Offsets, 2009, DERM.

Offsets as regulated by the Commonwealth Department of Environment, Water, Heritage and the Arts (DSEWPC), is as per the Draft Policy Statement: Use of Environmental Offsets under the *Environmental Protection and Biodiversity Conservation Act 1999*, 2007. It provides principles for offsetting unavoidable impacts on Matters of National Environmental Significance (MNES).

6.5.2. APLNG proposed offsets—strategy

The EIS and supplementary information presentation, confirms that the project will have unavoidable vegetation clearing requirements. The EIS broadly quantifies the extent of clearing, however due to the gas field development details not yet confirmed at this stage, an estimated worse case is presented. APLNG's Draft Environmental Offset Strategy (Rev B), supplementary to the EIS, outlines the project's environmental offset requirements, the methodology applied to calculate offsets, and the proposed approach and principles to find, secure and manage offsets. The Draft Environmental Offset Strategy is being developed in consultation with DIP, DSEWPC, DERM and DEEDI. These same agencies will be involved in developing each five year offset program and associated offset package.



The Draft Environmental Offset Strategy is a whole of project document which is designed to provide a framework for offsets throughout the entire 30 year project life. Due to the exact location of clearing activities in the gas fields still to be determined, the Draft Environmental Offset Strategy proposes that for each five year increment in the project, a tailored offset program be developed. This incremental approach ensures offsets accurately reflect vegetation clearing. Offset packages for each five year increment will be developed to offset clearing impacts at least twelve months in advance of the commencement of significant construction works. APLNG propose that reconciliation of offsets and clearing could be managed through the Annual Return process administered by DERM.

The Draft Environmental Offset Strategy quantifies the vegetation and biodiversity offset requirements however it is not yet finalised and some figures are undetermined at the time of writing this report. Vegetation and biodiversity offset requirements as currently drafted are summarised in Table 6.7. The Draft Environmental Offset Strategy does not supply a total estimate of offset requirements at the time of this report.

Table 6.7—APLNG life of project estimated offset requirements

Offset Type	Area (ha)
Listed Threatened Ecological Communities	90
Endangered Regional Ecosystems	91
Of Concern Regional Ecosystems	204
EPBC Act Listed fauna habitat	815
EPBC Act Listed flora habitat	23
NC Act Listed threatened fauna habitat	NYD
NC Act Listed threatened flora habitat	44
Terrestrial marine environments	36
Intertidal and sub-tidal areas	8
Sea grasses	21

NYD: not yet determined

In addition to vegetation and biodiversity offsets requirements, APLNG acknowledge there may be offsets required for impacts on World Heritage values as a result of the project in the Great Barrier Reef World Heritage Area. At the time of this report, no determination of World Heritage offsets had been identified, and consultation between APLNG and DSEWPC was continuing.

The determination of the suitability of direct offsets will involve consideration of a number of prioritisation criteria. These include:

- tenure and land use constraints
- distance from area of impact
- connectivity
- size
- mature vegetation
- existing level of protection
- habitat potential
- spatial arrangement.

The Draft Environmental Offset Strategy proposes that where direct offsets are not possible or practical, indirect offsets should be considered including:

- actions that reduce threatening processes
- studies that lead to improved conservation outcomes
- monitoring of populations where there is little current knowledge.

The Draft Environmental Offset Strategy proposes multipliers that could potentially be applied to calculate offset requirements. These have been determined based on relevant offset policies and negotiations with relevant administering authorities as summarised in Table 6.8.



Table 6.8—Proposed offset multipliers

Environmental Value	Proposed Multiplier	Multiplier Source
VM Act Endangered Regional Ecosystems	2	VMO Policy
VM Act Of Concern Regional Ecosystems	2	VMO Policy
NC Act listed threatened flora habitat	3	DERM consultation
NC Act listed threatened fauna habitat	1	DERM consultation
EPBC Act Threatened Ecological Communities	2.5	DSEWPC consultation
EPBC Act Threatened species habitat	3	DSEWPC consultation

6.5.3. Agency comments regarding APLNG proposed offsets

DERM has advised that the system for reporting on offsets, management, how offset values are met and maintained and reconciliation should cover:

- an initial offset package, consisting of specific land tenures, their environmental values and related management commitments/funding, is to be provided within 6 months of the following:
 - 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 activities
- the offset package is to be based on the specific offset requirement derived from ‘ground truthing’ of endangered ecosystems or species, biodiversity values 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 detail (quantity and quality) disturbance and rehabilitation that includes: (a) a current account (audit at commencement of operational plan period) of disturbance; (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 biodiversity and vegetation values and use category descriptions that are inclusive of and consistent with Commonwealth the EPBC Act (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, maintained and updated on the proponent’s website for the duration of the 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 maintained and updated on the proponent’s website for the duration of the project
- the reconciliation statement is updated at least annually by the proponent
- the reconciliation statement (third-party audit reconciled) is to be submitted to relevant State and Commonwealth environment administering authorities for the project (DERM and DSEWPC) on the first annual anniversary of date of approval, and annually thereafter.

6.5.4. Coordinator-General’s conclusion

APLNG has not provided sufficient detail in its draft offsets program for it to be approved within this report. Environmental offsets must be secured by the proponent in a manner that achieves a ‘no net loss’ of biodiversity outcomes. An environmental offsets program, consistent with QGEOP must be provided to the Coordinator-General for approval. Relevant conditions to this effect are included in Appendix 1, Part 1, Condition 5.



7. Gas fields

7.1. Gas field activities

APLNG propose to develop 570,000 hectares of the Walloons gas fields in the Surat Basin over a period of some 30 years, to provide coal seam gas (CSG) to the proposed coal seam gas liquefaction and export facility on Curtis Island, near Gladstone in Central Queensland.

The EIS stated that the proposed gas field development areas would be:

Table 7.1—APLNG Gas Field Development Area Schedule

Development Area	Scheduled	Area hectares	Wells (indicative only)
Talinga/Orana	2011–2023	51,800	900
Combabula/Ramyard	2012–2031	184,700	3280
Condabri	2013–2023	46,000	800
Kainama	2015–2028	15,300	230
Carinya/Dalwogan	2015–2045	130,300	2300
Woleebee	2016–2029	15,400	240
Gilbert Gully	2016–2034	129,200	2250
Total		572,700	10,000

The EIS stated that about 5,000 wells will be drilled in the first 10 years and a further 5,000 wells will be developed over the remaining period. The timing of well development will be determined on the actual productivity of each well.

In August 2010 APLNG advised that following re-assessment the number of wells developed in the first 5 years of project development to be typically 150–400 wells per year.

Typical spacing of wells will be 750 metres and drilling depths would be between 600 and 1,000 metres, although the actual configuration of the drilling will be determined by the site constraints, such as land use and environmental values.

The gas is held in geological structures and is under pressure by groundwater (also termed “CSG water”). Well field development will involve vegetation clearing for access to and layout of each well. The lease area of each well will be about 1 hectare during drilling and development. Gas well installations will include a well head separator, a flare pit, pump drive, a modular power supply unit (micro-turbine), metering and telemetry.

Supplementary information provided by the proponent in August 2010 indicated that once established, an area of about 625 m² would be required for operations; the remainder of the well development area will be rehabilitated.



CSG and CSG water would be separated at the well head. Low pressure gas would be reticulated by a network of HDPE gas gathering pipes to the nearest gas processing facility (GPF) and CSG water would be piped to water treatment facilities (WTF). The proponent has advised that pipe alignments will be established by constraints mapping and ground-truthing. The approximate length of gathering pipeline would be 1,000 metres per well. In the first 5 years it is expected that the gas gathering lines will be completed for:

- Combabula: 616 km
- Condabri: 839 km
- Talinga/Orana: 727 km.

Over the life of the project about 10,000 km of gas gathering pipes would be required.

Rather than bringing in reticulated electricity to each well site, modular micro-turbines or small gas reciprocating engines will be installed to provide power for wellhead compressors and CSG water pumping.

The major installations in the gas fields would be the GPFs. The original proposal, as stated in the EIS, was that 23 GPFs would be constructed across the gas fields and operated over the 30 year life of the project. The arrangement was subsequently revised and currently it is proposed to construct 8 GPFs in the first 5 years and a further 3 GPFs over the remaining period of the project. Each of the GPFs will comprise:

- dehydration units (removal of residual water from the gas to facilitate compression for transmission purposes)
- compressors
 - 100 TJ/d GPF would require two centrifugal compressors driven by electrical motors using grid power.
 - 225 TJ/d GPF would require six centrifugal compressors
- power supply—this would be provided by onsite generation by a 34MW portable gas-fired power plant for up to 5-years until a planned 275kV backbone power link has been completed. The portable power generators would then be relocated or maintained to provide peak load power back to the grid.
- gas flare
- administration and stores.

The proponent has advised that the footprint for each GPF will be similar to that of Spring Gully and Talinga (about 4 ha)²⁵.

About 880 km of high pressure steel pipelines will connect the GPFs to the main gas transmission pipeline including connection to the existing Spring Gully gas plant and to the Darling Downs Power Station pipeline.

The main gas transmission pipeline will extend approximately 362 kilometres from the junction of the two lateral branches to the proposed LNG plant site on Curtis Island near Gladstone.

The EIS stated that the lateral pipelines will be:

- the Woleebee lateral extending approximately 128 kilometres eastwards from the Combabula, Ramyard and Woleebee developments and from an interconnect to the Darling Downs Pipeline to the junction with the main pipeline
- the Condabri lateral extending approximately 99 kilometres from the Condabri and Talinga North developments to the junction of the above two laterals.

Supplementary EIS information provided by the proponent revised the scale of the laterals to be:

- Woleebee lateral is approximately 90 km and connection to the DDPS from Reedy Ck is approximately 24.5km
- Condabri Lateral is approx 78 km and Talinga North spur is approximately 21.5 km.

²⁵ EIS Volume 2, Chapter Section 3.2.8



Coal seam gas water

The proponent has estimated that releasing the CSG from the Walloon strata will generate CSG water volumes approximating 100 ML per day within the first 5 years of the project development. The volumes will peak at around 145 ML per day by 2024. By 2045 the CSG water extraction volume will cease. The CSG water will be piped to collection points, treated for re-use or disposal. Basic water management infrastructure will include water transfer stations to assist in pumping water to the nearest water treatment plant. The transfer stations consisting of a lined pond, a pump and a power generator will be located near access tracks and fencing where possible.

Water treatment plants for the first 5 years will be located at:

- Reedy Creek: 40 ML per day capacity plant by 2014
- Condabri: 40 ML per day capacity by 2014
- Talinga: an augmentation of the existing 20ML per day capacity to 40 ML per day capacity plant by 2013.

The purpose of water treatment is to reduce the salt content of the CSG water, creating a water resource that could potentially be used for a variety of purposes. Water treatment will involve pre-treatment to remove coarse sediments, pH balancing, disinfection, filtration and micro-filtration and ion-exchange. Final treatment by reverse osmosis will reduce salinity levels down to levels for specific re-use proposals such as irrigation, industry, urban requirements and dust control.

Production of treated CSG water (permeate) would be as follows:

- Reedy Creek: 35 ML per day
- Condabri: 36 ML per day
- Talinga: increasing of the current 18ML per day capacity to 36 ML per day

Supplementary information provided by the proponent stated that the preferred management arrangement for CSG water is to treat it to reduce salinity to approximate the salinity of surface waters and release the treated water to the open environment for uses including irrigation of crops and industry.

The proponent is investigating several options including:

- supplementing water allocations (regulated and high flow) below Chinchilla Weir on the Condamine River (from Talinga WTF for beneficial use post January 2012 and Condabri WTFs for beneficial use post February 2014)
- new irrigation development with direct reticulation from WTP (Reedy Creek WTF post January 2013)
- possible treatment for urban water supply (subject to successful negotiations)
- aquifer injection to offset aquifer drawdown particularly in the Walloons area (subject to successful outcome of trial injections)
- aquifer injection for disposal of partially treated or untreated CSG water.

Brine management

The EIS stated that the treatment of CSG water will require brine ponds to be established in the vicinity of each water treatment facility. The surface area of the brine ponds would need to be:

- Reedy Creek: 80 ha by 2013 and 160 ha by 2014
- Condabri: 80 ha by 2014
- Talinga: 130 ha by 2013 (Note that there is an existing brine pond at Talinga with a surface area of 70 ha).



The EIS²⁶ stated that CSG water in the gas field contains total dissolved salts (TDS) at rates varying from 6,534 to 2,450 mg/L. Adjacent areas of the gas field at Spring Gully has 7,500 mg/L TDS. The main by-product of desalination will be brine (waste water containing dissolved salts in excess of 35,000 mg/litre). APLNG has stated that the brine volume will be concentrated by evaporation to facilitate brine waste disposal and that concentrations would approach 100,000 mg/L, which would leave 95 per cent of the CSG water treated to quality suitable for beneficial uses proposed in the EIS.

Based on an assumed average CSG water volume of 120 ML/day, an average TDS of 4,000 mg/L and 90 per cent removal of salts, the mass of salt contained in the brine in the first 5 years could total 438,000 tonnes per year and based on the predicted CSG water production volumes, the mass of salt produced over the life of the project could exceed 2,000,000 tonnes at an average CSG water production of 80 ML/day and a 30 year project life.

APLNG stated that it is reviewing options for management of concentrated brine including:

- recycling by chemical processing
- treatment by chemical processes to create useable or saleable products
- injection into natural underground geological structures and are geologically isolated and do not contain groundwater that could supply potable or agricultural uses
- disposal or brine solution by ocean outfall
- solid salt placed in a regulated waste management facility.

A further element of the development involves 'hydro-testing'—pressure leak testing using CSG water. This will entail construction of 13 tanks with a 1 ML capacity, 2 filling ponds with a capacity of 18 ML and 14 ML, 2 discharge ponds with capacity 18 ML, and three combined fill and discharge ponds with capacities 25 ML, 23 ML and 2 ML.

The water management component of the proposal is described in some detail in Section 7.4 of this report.

Other activities

Gas field development will require supporting infrastructure including access roads, telecommunications towers, warehouses, administration buildings and temporary accommodation facilities:

- temporary construction camps for approximately 600 personnel each. The proponent has stated that there will be seven temporary construction camps in the first 5 years of the project development. Each camp will occupy a footprint area of approximately 1.6 ha
- lay-down sites where pipes will be stored after transport from Gladstone will occupy 5 sites, each with a footprint of 3.5 ha. Generally, the lay-down areas will be occupied for about 4 months, except for the site nearest Wandoan, which will be required for about 8 months, due to the more extensive development requirements in that area.

The nature of these activities will necessitated entry onto occupied land by the proponent and the proponent's contractors with a range of vehicles, equipment and materials required to undertake a variety of tasks including vegetation clearing and mulching, drilling, blasting (potential), earthworks, access road construction, concrete construction, steel fabrication and building.

Also, the gas field activities require use of a range of chemicals and materials including drilling mud (bentonite), biocides, flocculants, anti-scalant, diesel fuel, hydraulic and lubricating oils, tri-ethylene glycol, sodium hypochlorite, sodium hydroxide, sodium bisulphate, hydrochloric acid, anhydrous ammonia and citric acid.

The proponent has had significant experience in CSG development within the Surat basin. Presently, 7 FCSs have been installed in the gas field areas (Kenya, Talinga, Peat, Talooona, Strathblane, Spring Gully and Fairview).

²⁶ EIS Volume 2 Chapter 12, Table 12.2 et seq.



Easements

Gas and water gathering pipelines will be trenched and buried within 18 metre maximum width corridor throughout the gas fields and connected to gas processing facilities and water treatment facilities respectively. High pressure trunk lines will have 50 metre easements.

Existing land use

The EIS summarised gas field land use in Volume 2, Table 6.2. Grazing is stated to be the dominant land use (ranges from 97.5 per cent in Kainama to 50.9 per cent in Carinya) in all areas except for Gilbert Gully where the dominant activity is forestry production (57 per cent). Dry-land cropping and horticulture development also takes place on significant areas of the gas field (ranges from 27.6 per cent on Carinya to 0.2 per cent on Kainama). Generally, residential occupation across the rural areas of the gas fields is low, an exception being Gilbert Gully, which has an area of rural residential allotments. Also, the township of Miles is located within the Condebri gas field development area and smaller allotments make up the immediate surrounds to Miles.

Extensive areas of the Surat Basin that mapped as cropping land in the EIS²⁷ have also been identified by DERM in the policy framework for Strategic Cropping Land. The proposed policy states that the best cropping land is a finite resource that must be conserved and managed for the longer term. As a general aim, planning and approval powers should be used to protect such land from those developments that lead to its permanent alienation or diminished productivity.

The Queensland Government's policy states that:

“The best cropping land, defined as strategic cropping land, is a finite resource that must be conserved and managed for the longer term. As a general aim, planning and approval powers should be used to protect such land from those developments that lead to its permanent alienation or diminished productivity”.

7.1.1. Existing remnant vegetation

Information provided in the EIS indicated about half of the 572,700 ha gas field tenement area supports remnant vegetation. Volume 5 Attachment 14 of the EIS reported that the broader study area (1,470,000 ha envelope incorporating gas field tenements and a 40 kilometre corridor in which pipelines and other ancillary infrastructure could be placed) is a highly modified landscape, within which some large tracts of native vegetation persist. These are generally on higher elevation, less fertile lands in State Forest areas. Endangered Brigalow communities, on the other hand, are remnants of once widespread woodland on more fertile soils that have been intensively grazed and affected by fire regimes.

Identification of important habitats for endangered, rare and vulnerable flora and fauna was undertaken by APLNG's consultants in accordance with accepted protocols for scientific research, confirming the significance, extent and location of remnant vegetation, thus providing a basis for planning and management decisions that the proponent must adopt to minimise environmental risk.

The surveys and mapping also identified the presence of weed and pest species that could threaten the effectiveness of management if the impacts are not properly considered and integrated into an holistic management regime.

The Commonwealth 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 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.

²⁷ EIS: Volume 2, Chapter 6



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.

Using mapping from DERM, broad identification of Category B Regional Ecosystems (Biodiversity) has been broadly identified within the gas fields.

Further detail has been presented in the EIS regarding remnant “*Endangered*” regional ecosystems (presented in Section 8.3). These are recorded as endangered communities RE11.3.1, RE11.3.2, RE11.4.3, RE11.4.7, RE11.4.10, RE11.9.4 and RE11.9.5.

No gas field activities have been proposed in areas identified as Category A ESAs.

The estimated extent of listed ecological communities existing within the gas fields is substantial, comprising listed ecological communities under the EPBC Act (Commonwealth), and ‘endangered’, ‘of concern’, ‘least concern’ or ‘not of concern’ regional ecosystems under the *Vegetation Management Act 1999* (VMA) (Qld).

Table 7.2—Extent of remnant vegetation within the gas field, based on regional ecosystem status

Remnant vegetation—Regional ecosystem status	Area (ha)
EPBC-listed	10,208
Endangered (VMA)	606
Of Concern (VMA)	2,191
Least Concern (VMA)	202,255
Not of Concern (VMA)	0
Total	215,260

Comprehensive information regarding flora and fauna assessments undertaken for the project has been provided in Volume 2, Chapter 8 of the EIS. According to the EIS, the specific ecological communities and regional ecosystems within the gas fields, based on Queensland Herbarium mapping, are as follows:



Table 7.3—Ecological communities and regional ecosystems in the gas fields

Regional ecosystem	Description	VMA Status	EPBC Status	Extent within gas field (ha)	Extent to be disturbed (ha)	% of total current extent within Brigalow Belt Bioregion
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina ristate</i> open forest on alluvial plains	Endangered	Endangered	187	4.51	0.03
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of Concern	Endangered *	4,498	129.13	0.72
11.3.3	<i>Eucalyptus coolabah</i> woodland on alluvial plains	Of Concern	-	292	7.81	0
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. Tall woodland on alluvial plains.	Of Concern	-	755	10.21	0.29
11.3.14	<i>Eucalyptus</i> spp. <i>Angophora</i> spp. , <i>Callitris</i> spp. Woodland on alluvial plains	Least Concern	-	8,315	195.67	0
11.3.16		Least Concern		0 [^]	2.96	-
11.3.17	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland on alluvial plains	Of Concern	-	37	0.98	0
11.3.18	<i>Eucalyptus populnea</i> , <i>Callitris glaucophylla</i> , <i>Allocasuarina luehmannii</i> shrubby woodland on alluvium	Least Concern	-	1,112	33.18	6.99
11.3.19	<i>Callitris glaucophylla</i> , <i>Corymbia</i> spp. And/or <i>Eucalyptus melanophloia</i> open forest to woodland on Cainozoic alluvial plains	Least Concern	-	10	6.62	0
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least Concern	-	8,655	249.06	0.20
11.3.26	<i>Eucalyptus moluccana</i> or <i>E. macrocarpa</i> woodland to open forest on margins of alluvial plains	Least Concern	-	2	0	0
11.3.27	Freshwater wetlands	Least Concern	-	0 [^]	0.40	-
11.3.39	Silver-leaved Ironbark <i>Eucalyptus melanophloia</i> +/- Baradine red gum <i>E. chloroclada</i> woodland on undulating plains and valleys with sandy soils.	Least Concern	-	0 [^]	3.10	-
11.4.3/11.4	<i>Acacia harpophylla</i> and/or <i>Casuarina cristate</i> shrubby	Endangered	Endangered	1,371	18.86	2.38



Regional ecosystem	Description	VMA Status	EPBC Status	Extent within gas field (ha)	Extent to be disturbed (ha)	% of total current extent within Brigalow Belt Bioregion
.3a	open forest on Cainozoic clay plains. Black tea-tree <i>Melaleuca bracteata</i> woodland fringing swamp associated with brigalow <i>Acacia harpophylla</i> communities.					
11.4.7	Open forest to woodland of <i>Eucalyptus populnea</i> with <i>Acacia harpophylla</i> and/or <i>Casuarina ristate</i> on Cainozoic clay plains	Endangered	Endangered	41	0.43	4.24
11.4.10	<i>Eucalyptus populnea</i> or <i>E. pilligaensis</i> , <i>Acacia harpophylla</i> , <i>Casuarina ristate</i> open forest to woodland on margins of Cainozoic clay plains	Endangered	Endangered	36	0.90	0
11.4.12	<i>Eucalyptus populnea</i> woodland on Cainozoic clay plains	Endangered	-	606	12.72	0
11.5.1/11.5.1a	<i>Eucalyptus creba</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains/remnant surfaces. Poplar box <i>Eucalyptus populnea</i> woodland with bulloak <i>Allocasuarina luehmannii</i> low tree layer on Cainozoic sand plains and remnant surfaces.	Least Concern	-	81,587	2344.70	0.01
11.5.4/11.5.4a	<i>Eucalyptus creba</i> , <i>Callitris glaucophylla</i> , <i>C. endlicheri</i> , <i>E. chloroclada</i> , <i>Angophora leiocarpa</i> on Cainozoic sand plains/remnant surfaces. Deep sands. White cypress pine <i>Callitris glaucophylla</i> +/- <i>Eucalyptus</i> spp. and <i>Corymbia</i> spp. woodland on Cainozoic sand plains and remnant surfaces.	Least Concern	-	16,590	398.35	1.97
11.5.5	<i>Eucalyptus melanophloia</i> , <i>Callitris glaucophylla</i> woodland on Cainozoic sand plains/remnant surfaces. Deep red sands.	Least Concern	-	5,530	213.17	0.09
11.5.20	<i>Eucalyptus moluccana</i> and/or <i>E. microcarpa</i> <i>E. pilligaensis</i> ± <i>E. creba</i> woodland on Cainozoic sand	Least Concern	-	4,346	170.75	0.29



Regional ecosystem	Description	VMA Status	EPBC Status	Extent within gas field (ha)	Extent to be disturbed (ha)	% of total current extent within Brigalow Belt Bioregion
	plains					
11.5.21	<i>Corymbia bloxsomei</i> ± <i>E. creba</i> ± <i>Angophora leiocarpa</i> woodland on Cainozoic sand plains/remnant surfaces	Least Concern	-	2	0.01	0
11.7.1	Brigalow <i>Acacia harpophylla</i> and/or belah <i>Casuarina cristata</i> and mountain yapunyah <i>Eucalyptus thozetiana</i> or inland grey box <i>E. macrocarpa</i> woodland on lower scarp slopes on lateritic duricrust.	Least Concern	-	930	13.83	4.36
11.7.2	<i>Acacia</i> spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	-	6,134	176.06	0
11.7.4/11.7.4c	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> on Cainozoic lateritic duricrust. Gum-topped ironbark <i>Eucalyptus decorticans</i> +/- <i>Eucalyptus</i> spp. +/- <i>Acacia</i> spp. on low hills and ranges with shallow soils.	Least Concern	-	24,492	641.41	0.69
11.7.5	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	Least Concern	-	3,465	125.89	1.77
11.7.6	<i>Corymbia citriodora</i> or <i>Eucalyptus creba</i> woodland on Cainozoic lateritic duricrust	Least Concern	-	3,507	83.42	0.31
11.7.7	<i>Eucalyptus fibrosa</i> subsp. <i>Nubila</i> ±	Least Concern	-	24,918	513.04	0.08
11.9.4a/11.9.4b	Semi-evergreen vine thicket on steep upper and middle slopes where heavy clay soils form. Brigalow <i>Acacia harpophylla</i> +/- semi-evergreen vine thicket occurring on undulating plains and rises.	Of Concern	Endangered	177	13.27	0.29
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	Endangered	Endangered	3,898	45.21	1.42
11.9.7	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i>	Of Concern	-	82	2.85	0



Regional ecosystem	Description	VMA Status	EPBC Status	Extent within gas field (ha)	Extent to be disturbed (ha)	% of total current extent within Brigalow Belt Bioregion
	shrubby woodland on fine-grained sedimentary rocks					
11.9.10	<i>Acacia harpophylla</i> , <i>Eucalyptus populnea</i> open forest on fine-grained sedimentary rocks	Of Concern *	-	1,025	19.80	4.90
11.10.1/11.10.1d	<i>Acacia harpophylla</i> , <i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks. Narrow-leaved red ironbark <i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks.	Least Concern	-	3,200	140.78	0.17
11.10.9	<i>Callitris citriodora</i> open forest on coarse-grained sedimentary rocks	Least Concern	-	6,988	306.82	0.97
11.10.11	Popular box <i>Eucalyptus populnea</i> , silver-leaved ironbark <i>E. melanophloia</i> +/- white cypress pine <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks.	Least Concern	-	2,472	125.95	6.54
Total area of regional ecosystems within APLNG gas field				215,260		
Total area of regional ecosystems proposed to be disturbed					6,011.85	

* Only where weeping myall *Acacia pendula* occurs.

^ Not currently mapped by the Queensland Herbarium as existing within the gas field area.

7.1.2. Land disturbance and vegetation clearing

Impacts on ecological values

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

Detailed locations for wells, pipelines, access tracks and major gas field infrastructure have only been specified in indicative locations. Instead, the EIS described a strategy that APLNG will adopt for the site selection processes. The strategy seeks to optimise the effectiveness of plant and infrastructure required for CSG extraction, while fully recognising all constraints on locating works so as to avoid or minimise disturbance to environmental and social values.

Ecological constraints management

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, and intends to implement field management protocols (as specified for each constraints class) to reduce the impact of project activities on ecological values.

Constraints planning

The project planning strategy will involve the following ecological constraints planning steps:

- preliminary location of key project infrastructure, such as gas process facilities and water treatment facilities
- stakeholder and community engagement and review of existing land use
- multi-criteria analysis to objectively evaluate all known technical, environmental, social and cultural heritage constraints using existing information, and to identify further assessment requirements. This includes optimising the location of the project footprint
- analysis for selection of major technology and key practices. verification of available information by assessing recent aerial photography, site inspections, and revised mapping to ensure there were no additional constraints to sites selected through multi-criteria analysis
- refinement of major infrastructure locations and technologies based on further information and impact assessment processes
- identification of mitigation controls and monitoring requirements, based on a risk assessment process that considers legislative requirements and impacts on the natural environment, the community and cultural heritage.

The EIS also stated that desktop evaluation of proposed activity sites (such as the location of wells and access tracks) is to be followed by “on-site field scouting”.

The EIS stated that major plant and facility locations would be similarly assessed using technical, environmental and social criteria followed by detailed on-site investigations.

Other safeguards:

- the proponent has provided commitments to maintain minimum separation distances between infrastructure and sensitive receptors. If sensitive receptors are located within 800 metres of the temporary accommodation facilities the proponent will establish and implement vegetation planting strategies to screen the facilities
- minimise earthworks and, if needed, create multiple terraces rather than large cuts
- minimise construction time for activities within the visible areas of sensitive receptors
- so far as possible use open, cleared areas for establishing facilities and where it is necessary to remove vegetation, reduce the amount of clearing to the minimum areas required and retaining, in particular, vegetation to screen activity areas
- use surface treatments on structures and buildings that are coloured to minimise contrast with the surrounding landscape
- use existing farm tracks and roads where possible, and rehabilitating tracks no longer required for operational access
- minimising night activities that require lighting and use a sensitive lighting approach to prevent light spill, having regard to safety and security requirements
- remove surface infrastructure when it is no longer needed for the safe operation of infrastructure and rehabilitate sites to a condition as close as possible to the pre-development state.

These mitigation and management measures have been included in the statement of the proponent’s commitments in Appendix 6.

Regional ecosystems have been categorised based on sensitivities as described in Section 8.5.1 of the EIS. APLNG committed to limit clearing in areas of high biodiversity value, in accordance with the sensitivity categories. In addition, remnant vegetation will be protected through the implementation of Habitat Management Guidelines. The Habitat Management Guidelines will be incorporated into the Environmental Management Plan. Further to this, a Vegetation Offsets Program will be developed.



Clearing of remnant vegetation (direct disturbance)

Approximately 6000 ha of remnant vegetation is planned to be cleared in the 570,000 ha gas fields area. This equates to less than 2.8 per cent of the total remnant vegetation in the gas fields.

About 63 per cent of the tenements are pasture and 3 per cent, regrowth with limited value for significant flora and fauna species. Approximately 26 per cent of all remnant vegetation clearing in Queensland between 2003 and 2005 occurred in the Brigalow Belt bioregion.

Regarding clearing of remnant vegetation, the EIS stated that approximately 6,000ha within the gas fields will be cleared; however no regional ecosystem will lose more than 0.53 per cent of its area²⁸.

A management strategy based on sensitivity categorisation and Habitat Management Guidelines has been adopted by the proponent to provide a primary environmental safeguard so as to minimise the likely impact on terrestrial ecology and biodiversity.

An environmental offsets strategy has been developed (but not yet finalised), addressing both the Commonwealth and Queensland Governments' offsets legislation and policy. In this regard offsets should only be utilised in situations where impacts on environmental values are 'unavoidable', and that the offset must directly relate to the environmental value that will be impacted. Priority environmental offset areas are specified as follows:

- matters of national environmental significance
- endangered Regional Ecosystems (REs)
- of concern REs
- any REs where clearing may be considered as a significant impact
- particular endangered, vulnerable or rare fauna habitats
- endangered, vulnerable or rare flora-rich areas
- connections/corridors
- riparian areas
- areas containing wetlands
- areas linking/adjoining areas of:
 - any of the above
 - state significant areas as identified by DERM Biodiversity Mapping Methodology for the Brigalow Belt Bioregion
 - sensitive environmental areas.

In reviewing the nominated safeguards to minimise disturbance, many of these disturbances can be further reduced by adopting impact minimisation measures recommended in this report, plus the proponent's commitments to limit clearing and the Model Conditions.

7.1.3. Rehabilitation

As previously noted, the EIS proposed a total gas field footprint (direct disturbance) of approximately 26,700 ha, and stated that approximately 6,000 ha of remnant vegetation will be directly lost. The length of disturbance proposed by the project's gathering line easements and access tracks totals approximately 10,000 km, and thus these items demonstrate the widespread area in which impact may occur.

The EIS states that CSG activities, including the extraction and associated processing and ancillary activities, are a temporary activity that moves across the landscape, disturbing land and vegetation, and potentially changing (reducing) the land use capability for a period until a well site or other infrastructure is decommissioned. However CSG activities are not completely comparable with other mining activities in this respect, as they have temporary impacts while developed and some parts of the disturbances are rehabilitated as they converted to production. Since this occurs progressively, year by year, as wells are developed over approximately 20 year horizon, partial rehabilitation is achieved early, and further rehabilitation will ensue as the infrastructure and wells are decommissioned over the course of the project.

²⁸ EIS Volume 2, Chapter 8 Section 8.6.1



It is acknowledged that rehabilitation, i.e. the repair of unavoidable impacts of activities on the environment, is an essential part of developing resources in accordance with the principles of sustainable development.

Therefore, dedicated rehabilitation planning and implementation practices, incorporating accepted scientific principles, are considered to be fundamental in achieving a successful environmental outcome. It is necessary that rehabilitation of land and vegetation extend to those areas indirectly disturbed as part of project activities.

APLNG has committed to developing Habitat Management Guidelines including Rehabilitation and Revegetation Management Guidelines. It is considered that these guidelines must provide core commitments and details regarding rehabilitation across the entire gas field including:

- success criteria
- monitoring methods, frequency and duration, and
- post-disturbance vegetation types.

Physical, chemical and biological indicators are seen as necessary, to form the basis of rehabilitation success criteria, to determine whether rehabilitation objectives have been achieved and are likely to be sustained. Specific success criteria are also needed for rehabilitation of riparian areas, including stream bank stability, and for wetland areas. Pre-disturbance data and analogue sites should be used for comparison purposes.

In accordance with the principles of ecologically sustainable development, the EP Act administering authority will require the proponent to address these matters in a manner that will protect intergenerational equity issues. The guideline *Rehabilitation Requirements for Mining Projects*²⁹ provides information on both progressive and final rehabilitation requirements for mining projects operating in Queensland under the EP Act.

7.1.4. Coordinator-General's conclusions

The APLNG proposal has the potential to change current land use patterns through vegetation clearing to establish and operate gas field infrastructure and through impacts on surface and groundwater resources. Assets for Queensland's future prosperity such as strategic cropping lands could be at risk unless careful consideration is given to sustainable planning and management.

Accordingly, the proponent should reflect on the importance of strategic cropping land in recommendations given in Appendix 1, Part 1 and Appendix 2, Part 2.

The Coordinator-General's finding is that a significant proportion of gas field land (215,260ha) is occupied by remnant vegetation, and it is noted that in the EIS it is proposed that approximately 2.8 per cent (or 6,011.85ha) of this remnant vegetation will be directly lost as a result of APLNG gas field activities. In particular, the finding is that the EIS proposed that the 'worst case' remnant vegetation clearing for the project is as follows:

²⁹ DERM: EPA Guideline 18: Rehabilitation requirements for mining projects



Table 7.4—Proposed ‘worst case’ remnant vegetation clearing in the gas fields

Remnant vegetation regional ecosystem status	Extent within gas field (ha)	APLNG clearing—loss (ha)	% Cleared in APLNG gas field
EPBC-listed	10,208	212.31	2.08
Endangered (VMA)	606	12.72	2.10
Of Concern (VMA)	2,191	41.65	1.90
Least Concern (VMA)	202,255	5745.17	2.84
Not of Concern (VMA)	0	0	0
Total	215,260	6,011.85	2.79

Environmentally sensitive vegetation can be protected through project planning, appropriate design and effective management of the development activities and safeguarded through commitment to operational management and where disturbance or destruction cannot be avoided, by environmental offsets. While there will be situations where vegetation impacts are unavoidable, the proponent must take all steps necessary to identify and assess, in detail, the values represented by the threatened communities and then adopt appropriate management systems to minimise the areal extent of damage to those values.

It is noted that the proponent has developed a sensitivity categorisation system, based on regional ecosystem mapping that recognises areas of extreme sensitivity, high sensitivity, sensitive, neutral, robust, and cleared.

From this the project has developed a Constraints Planning Strategy and tools for selection, siting and validation of field development areas, from which will be assembled consequent operational plans. Details of the proponent’s Constraints Planning Strategy are outlined above in section 7.1.2.

The approach taken by the proponent to protect the integrity of important vegetation communities by the constraint planning is supported. In this regard Condition 1, Appendix 2, Part 2 sets out the Coordinator-General’s requirements that these commitments be incorporated in the EM Plan.

In relation to activities necessary to be undertaken within an endangered/of concern regional ecosystem and its associated buffer zone, conditions are set to define the minimum level of protection that must be achieved.

The level of remnant vegetation clearing proposed as part of APLNG gas field activities, being 2.8 per cent of remnant vegetation of the area, is stated to be the ‘worst-case’ level of disturbance that is possible based on constraints planning at this stage of the project development.

Conditions in this CG report have been set to limit and possibly reduce the disturbance footprint and thus prevent and minimise direct impacts on remnant vegetation and endangered, vulnerable or rare fauna habitats.

To be sure, Condition 1, Appendix 1, Part 2, requires this ‘worst case’ vegetation clearing estimate to be revised, and re-calculated in accordance with the range of impact minimisation strategies, constraints management requirements and conditions set out in this CG report. These revised estimates to be presented in the EM Plan,



Best available well development technology and methodologies must be utilised, including horizontal directional drilling and multiple-pad drilling, to avoid clearing of: threatened ecological communities; 'endangered' and 'of concern' regional ecosystems; endangered, vulnerable or rare fauna habitats; and all other areas identified as having high ecological values. Appendix 2, Part 2, Condition 1 reflects this requirement.

APLNG is required to provide auditable commitments in the EM Plan (pursuant to Appendix 2, Part 2, Condition 1) regarding use of these best available technologies and methodologies in all areas identified as having high or very high ecological values.

It is noted that the proponent has provided commitments in section 8.6.2 of the EIS that attempt to preserve biodiversity values. In this regard, all identified commitments are to be included in the EM Plan, and each of the commitments are to be translated into auditable measures within the EM Plan. The requirement to prepare an EM Plan can be found at Appendix 2, Part 2, Condition 1.

Consideration has been given to the need for specific commitment to the principles of the *Queensland Government Environmental Offset Policy 2008* (QGEOP). This issue is dealt with in Section 6.5, Environmental Offsets.

Nature Conservation Act

These requirements apply to clearing of plants protected under the *Nature Conservation Act 1992*. This is presented as Appendix 1, Part 1, Condition 7.

7.2. General conditions for gas fields

Activities and processes necessary for coal seam gas production must be considered within the overall framework of the EM Plan. DERM has advised further information requirements that should be provided to DERM in order to provide sufficient material prior to implementing environmental authorities for the gas fields. Specifications have been provided here and also included in the general conditions for gas fields, as outlined in Appendix 2, Part 2.

7.2.1. Plant and animal pests

The EIS included comprehensive lists of weed species in the project areas (the gas field weeds are described in Volume 2, Chapter 8). The EIS stated that the proponent will develop a weed management guideline aimed at minimising the spread of weeds throughout the study area and eradicating and controlling new weed infestations. The EIS also committed APLNG to working with regional councils in weed control and to developing a vehicle wash-down area near Miles. These undertakings are consistent with government agency and regional council requirements.

In the submission on the EIS the Department of Employment, Economic Development and Innovation (DEEDI) referred to fauna pest species and their control. In this regard DEEDI noted that the pipeline activities will necessitate openings in both the Wild Dog Barrier Fence (WDBF) and the Darling Downs-Moreton Rabbit Board Fence (DDMRBF).

Failure to control the spread of weeds and animal pests could lead to significant economic impacts. Further, weeds and pests are potential threats to regional ecosystems and they could adversely limit the effectiveness of land rehabilitation and revegetation. Condition 9, Appendix 1, Part 1 has therefore been included requiring weed management..

A condition requiring the proponent to enter into an agreement with the chief executive officer of DEEDI for any opening in the WDBF and the Darling Downs Moreton Rabbit Board for any opening in the DDMRBF.

7.2.2. Air emissions

The EIS provided information on sources of emissions in developing and undertaking operations in the gas fields. From an amenity perspective the emissions are those that cause nuisance, such as dust and odour, or otherwise reduce the visual qualities of the region, most likely be in terms of particulates in dust or smoke. Climatic conditions affect the intensity and duration of air pollution.



Air emissions also pose risks to human health and safety and ambient air quality standards have been established to benchmark safe living conditions for normal and sensitive receptors. DERM has not set requirements on the emissions from fuel burning equipment, however, best practice environmental management is required to minimise emission of pollutants. The EIS stated that emissions during development phases of the gas fields will be combustion gases from mobile plant and power generators and dust from construction activities and vehicle movements³⁰.

The EIS stated that modelling of air pollution emissions was completed for all areas of the gas fields, Predicted maximum ground level concentrations of NO₂ emissions from all combustion sources is predicted to be greatest east of Condamine, but still within (at 96 per cent) the air quality objective set out in the *Environmental Protection (Air) Policy*.

Dust suppression will generally be achieved by watering unsealed tracks and roads and by wash-down of vehicles before they leave work sites. The water used for dust suppression is likely to be sourced from treated CSG water. CSG water is a regulated substance and its release to the open environment must be in accordance with an EA approved by DERM.

The EIS stated that a risk assessment was undertaken to identify potential risks, causes and consequences associated with the gas field activities. Mitigation measures were nominated to address causes. Residual risks were assessed and the proponent has undertaken to apply safeguards to minimise air pollution.

These mitigation and management measures have been included in the statement of the proponent's commitments in Appendix 6. A general condition dealing with air-borne emissions is given in Appendix 2 Part 3 Condition E1.

7.2.3. Noise issues

Ambient noise levels in the gas fields are relatively quiet (particularly at night) except where there are communities, such as Miles, and on a temporal/seasonal basis where rural activities like cropping demand high levels of activities for relatively short periods during harvesting. Industrialisation of the rural landscape will lead to a rapid increase in population, increased vehicle movements and CSG industry activities that could increase the background noise and impose impact and vibration noises on the gas field areas and to a lesser extent on surrounding land.

Issues related to excessive noise emissions sometimes arises if there are temperature inversions and low winds that carry noise over large distances, even though the control of noise emissions at source is within acceptable limits.

Existing provisions of the EP Act specify that any building activity (including development of gas field wells) that creates an audible noise may only occur between the hours of 6.30 am to 6.30 pm (except Sundays and public holidays). Noise limits for activities undertaken outside these hours is regulated under an environmental authority (EA) for the petroleum activities (CSG production). The EP Act specifies acceptable levels for ground vibration and air blast overpressure that would apply to any required blasting necessary for construction of the gas field infrastructure.

Vibration criteria for human comfort are not applicable for the construction of the gas and water gathering pipelines as the activities involved in trenching, laying the conduits and restoring the sites are transient. However, a minimum separation distance of 100 metres from an activity and the nearest sensitive receptor (an occupied house) has been adopted by the proponent.

DERM has prepared a noise control guideline prescribing methods and procedures for setting EA noise and vibration conditions. Specifically the guideline is intended to address the issue of "noise creep" that arises from iterative increases in background noise, containment of variable noise and short term events to an "acceptable level" and setting noise limits to transient noise event to avoid sleep disturbance.

³⁰ EIS Volume 2, Chapter 13, Section 13.4



The EIS³¹ stated that noise monitoring and modelling has been conducted for the gas fields. The current background noise levels were found to be consistently at or below 15 dB(A) and only sites within 1 kilometre of major road transport corridors had higher night time background noise levels.

Gas well development will take place over a period of 5 to 12 days³², resulting in several distinct noise signatures that could cause disturbance to local residents.

Laying gathering lines for gas and water may firstly involve vegetation clearing, lowering the conduits into the trench, backfilling and restoring/revegetating. The disturbance period is usually less than 7 days and only takes place during day-time.

Construction of GPFs and WTFs and other line infrastructure would involve conventional industrial building techniques and separation distances from noise sensitive receptors would be greater than

- gas processing facilities: 1000 metres
- water treatment facilities: 400 metres
- gas wells: 300 metres.

Operational activities in the gas fields will involve well pumps driven by reciprocating engines. Alternative power units using micro-turbines are considerably quieter.

Gas flaring at wells may be required infrequently for maintenance shut down. More frequent flaring is likely to occur if the gas supply from the well field exceeds the processing capacity at the GPF. Flaring would be required for pressure relief. However, Flare noise is only discernible over short distances³³.

The EIS has stated that the safeguards will be adopted to avoid or minimise the degree of disturbance in the gas field. These mitigation and management measures have been included in the statement of the proponent's commitments in Appendix 6.

Coordinator-General's conclusion

Night background noise level in the gas fields is generally very quiet, except near transport corridors. However, gas field development will introduce significant changes and construction noise is likely to cause disturbance to some of the existing residents, depending on the type of noise (frequency, impact, vibration etc) separation distances, the terrain, noise characteristics of equipment being used, duration and timing of operations and other physical measures taken by the proponent to provide acoustic barriers.

It is recognised that even with all reasonable and practicable measures being taken by the operator at the noise sources, the gas field operations will in some cases still be likely to cause noise nuisance. In this regard it is incumbent on the proponent to thoroughly investigate each activity site in its relation to residential occupation and to present the administering authority with justification for noise sources and their characteristics. Therefore noise constraint conditions are included for fixed plant and equipment and for drilling activities. These conditions are in Appendix 2, Part 2, Conditions 2 and 3. This is a similar approach to that taken in Coordinator-General reports on other gas field development proposals.

7.2.4. Hydraulic fracturing (fracking)

CSG water is held in fissures of the coal seam. In some cases when the fissures are drained, the CSG will flow freely and can be extracted. However, because the fissures may have discontinuities that prevent efficient recovery of gas, hydraulic fracturing or "fracking" is adopted to expand the cracks from less than 1 mm to between 5 and 50 mm wide. The proponent has provided supplementary information indicating that the cracks may be generated in a radius of 100 to 200 metres horizontally and up to 30 metres vertically.

Fracking involves pumping a fluid comprised of largely water and inert "propping material" such as sand, under pressure, into a coal seam. This action fractures the coal seam which provides a pathway that increases the ability for gas to flow through the coal.

³¹ EIS: Volume 2, Chapter 2, Section 15.3

³² EIS Chapter 2, Volume 15, Section 15.4.1

³³ EIS: Volume 2, Chapter 15 Section 15.4.2



Depending on the mineral structures in the coal seam beds, the process may be repetitive and involve variations in the suite of chemical compounds and other substances used.

Before introducing the fracking fluid, the well casing must be perforated at several elevations within the coal seam, to permit discharge of the fracking fluid and release of the CSG and water.

Typically the processes involve:

- initial acid injection (where coal seams are filled with natural calcite (calcium carbonate). Generally hydrochloric acid is used in this circumstance. (APLNG has advised that acetic acid will be used in combination with caustic soda to “adjust the pH”)
- fracking fluid injection
- slurry injection—a slurry of fracking fluid and beach sand or ceramic beads that remain in the cracks after the hydraulic pressure has been released
- flushing—using water only to force the remaining fracking fluids into the coal seam
- extraction—pumping out most of the fracking fluids, together with small amounts of CSG water, which is stored in tanks or lined ponds and treated to a standard required by the EA conditions.

DERM has published a fact sheet that provides an assessment of the likely effects of fracking in this State³⁴. Based on that document and on information provided by the CSG proponents including APLNG, the chemicals and materials used are likely to include:

- water—the principal fluid base for conveying sand into the coal seam fissures
- beach sand (or inert ceramic beads)—to prop open the fissures when the initial hydraulic pressurisation is released
- thickening agent—guar gum, a natural organic polymer used to thicken sauces in cooking is commonly used, as it has excellent properties to hold sand in suspension and therefore extend the length of opened cracks (0.149 per cent)
- sodium chloride—used to delay the breakdown of the gel (0.016 per cent)
- potassium chloride—used to stabilise clay to prevent swelling that could block the fissures (2 per cent)
- acetic acid and caustic soda to balance the natural acidity (pH) of the water
- boric acid, monoethanolamine (MEA), ethylene glycol (MEG)—used to increase the viscosity of the gel fluid (0.023 per cent)
- ethyl alcohol—to reduce surface tension to aid gas flow (0.090 per cent)
- terpenes, terpenoids, (sweet orange oil)—to reduce surface tension to aid gas flow (0.005 per cent)
- naphtha—to reduce surface tension to aid gas flow (0.149 per cent)
- bronopol—used to prevent bacteria growth (0–15ppm)
- bleach—used to prevent bacteria growth (0.010 per cent)
- caustic soda—used to eliminate bacteria in water (0.001 per cent).

Other chemicals could be used to replace those on the above list. DEEDI advises that CSG operators have indicated that BTEX (benzene, toluene, ethylbenzene and xylenes) organic compounds **are not used in Queensland coal seam gas fracking operations**³⁵. The proponent's commitments in this regard have been included in the statement of the proponent's commitments in Appendix 6

EM Plans, developed in accordance with Section 310D of the EP Act 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 22.

³⁴ Hydraulic fracturing (fracking) in CSG Wells <http://www.derm.qld.gov.au/factsheets/pdf/environment/en10.pdf>

³⁵ <http://www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=15795>



7.2.5. Operational plan—soils management

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 Appendix 1, Part 1, Condition 8 and Appendix 2, Part 3, Condition D18 of the Model Conditions.

Construction management plan

DERM advised that in many cases engineering design and associated mitigation measures are required for full development of conditions for relevant statutory approvals. As previously noted in this report, the EIS does not provide sufficient information on some of these issues—particularly on specific activity sites.

It is concluded that the proponent should 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 a component of Appendix 2, Part 2, Condition 5.

Subsidence

Subsidence in the gas field could occur when one or more of the following conditions are present:

- a significant reduction in reservoir pressure
- the gas/water strata has considerable thickness.
- the gas/water strata are relatively weak and poorly consolidated.
- the reservoir has a considerable area extent compared with the reservoir depth

The degree of subsidence would be governed by the subsurface geology and in most situations subsidence may be slight or not be noticeable due to existing surface vegetation and land uses.

If subsidence was to occur, surface development could be adversely affected and in more severe circumstances, surface drainage conditions could change.

It is noted that the Commonwealth conditioned both the GLNG and QCLNG projects in regard to subsidence pursuant to its obligations under the *Water Amendment Act 2008 (Cwlth)* in protecting MNES and it is expected to similarly condition the APLNG project.

7.2.6. Third party audit

The EIS stated that Origin operates under an established health, safety and environment (HSE) management system to minimise and manage the impacts on employees, contractors, the environment and the communities in which the company operates. The HSE management system has been developed in accordance with Australian/New Zealand Standard ISO 14001 Environmental Management Systems. Consistent with the ISO 14001 environmental management system, it is reasonable to expect third party auditing of environmental management for the whole project and that audit reports will be conveniently available to meet requirements in Appendix 1, Part 1, Condition 1.

7.3. CSG model conditions

The following section outlines how “model conditions” are integrated into the approval process for CSG gas fields to account for the information flow requirements for progressive field development.



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.

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 guidelines are accessible from the Queensland Department of Environment and Resource Management at the following link:

http://www.derm.qld.gov.au/environmental_management/coal-seam-gas/index.html.

In addition to this further strategic policies have developed by the Government to deal with monitoring of groundwater resources, and cumulative impacts on groundwater. This includes implementing new legislation to protect landholder's groundwater supplies and natural springs, if there are any impacts of CSG water extraction. Where the impacts of different CSG producers overlap, cumulative management areas (CMAs) will be declared and regulated in a coordinated way. An independent authority, the Queensland Water Commission, will have dedicated resources to manage and monitor CMAs.

A fact sheet—*New Arrangements to Protect Groundwater Resources in Coal Seam Gas Extraction Areas*³⁶ provides an outline of the statutory framework being developed to ensure CSG producers manage the impacts of water extraction.

7.3.1. 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 the Coordinator-General and DERM of the proposed gas field development arrangements.

The model conditions provide 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 flow-lines, 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.

³⁶ DERM: <http://www.derm.qld.gov.au/factsheets/pdf/environment/en1.pdf>



7.4. Coal seam gas water

The gas extraction process releases water under pressure within the coal seam. Water must be pumped from the well (de-watering) to reduce hydrostatic pressure before gas can start flowing to the surface.³⁷ This water is known as CSG water. As coal seams are dewatered the volume of water pumped typically decreases over time and the gas production increases as the coal seam is dewatered.

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.

The management of CSG water by APLNG is a major element of the project's management regime, and will involve dealing with water volumes, brine disposal, sodicity and potential land contamination factors. APLNG proposes to treat CSG water by reverse osmosis, to contain brine in engineered water ponds, to dispose treated water by a number of DERM permitted methods, termed "beneficial uses", with the major initial strategy being to discharge treated waters into suitable watercourses under controlled conditions.

The following sections outline the CSG water management issues and the proponent's CSG water management plans.

7.4.1. CSG water characteristics

CSG water—volumes

The APLNG project will produce large volumes of untreated CSG water. Daily, annual and total volumes over the life of the APLNG project are provided in Table 7.5 based on information supplied in the EIS and supplementary information.

Table 7.5—Volumes of APLNG CSG water extraction/production³⁸

CSG water extraction/production	Volume (ML/day)	Volume (GL/year)
Yield (5-year average) (2 trains)	40 ML/day	14 GL/year
Yield (peak) (year 2026)	135 ML/day	49 GL/year
Total volume over 30 year life of project based on an average of 80 ML/day (4 trains)		661 GL

The EIS indicated that during the first 5-year period CSG the gas field development would yield about 100 ML/d from the Talinga, Combabula, Orana and Condabri development areas, with small quantities from the Dalwogan and Ramyard areas. (It is noted that under an existing DERM approval, 20 ML/day can be discharged from existing gas field developments in the Talinga gas field).

The peak CSG water yield, of about 135 ML/day, would not occur until 2021, with the main yield contribution being derived from Gilbert Gully. Some 1085 GL of CSG water could be extracted over the 30 year life of the project.

³⁷ EIS: Volume 2, Chapter 12

³⁸ EIS Supplementary information, 27 July 2010



For comparison to the above CSG water extraction volumes:

- the sustainable yield (10 per cent failure) from the Condamine River is 2.3 GL/year (Source ANRA 27 June 2009)
- the SEQ desalination plant at Tugun which supplies the SEQ Water Grid has an operational capacity of 125 ML/day
- the main water conservation storage in SEQ is Wivenhoe Dam, which has a conservation storage capacity of 1,165 GL.

Treatment and management of CSG water for re-use or disposal are discussed in Section 7.4.3 of this report.

APLNG CSG water—production of salts

Coal Seam Gas 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.

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.

The salt concentrations vary significantly across the Walloons coal strata. Table 7.6, reproduced from the EIS, shows the principal constituents in CSG water in the APLNG gas field development area.

Table 7.6—Indicative APLNG fields CSG water quality ³⁹

Water quality Property	Gas Field Development Area				
	Combabula	Talinga	Orana	Condabri	Spring Gully ⁴⁰
Total Dissolved Salts (mg/L)	6,534	2,540	2,450	3,693	7,500
pH	8.3	8.7	8.8	8.3	9
Total suspended solids (mg/L) ⁴¹	38	39	9	80	65
Sodium absorption Ratio	115	160	135	138	170
Residual Alkalinity (meq/L)	13.6	37.4	30.5	29.0	43.0
Fluoride by ISE (mg/L)	0.9	3.9	3.3	1.9	5.9

CSG water contains a range of chemical constituents that are a constraint on the management for reuse or disposal of the water. Table 7.7 and Table 7.8 indicate the variability of the water chemistry throughout the APLNG well field and the potential production quantities of 'salt' after desalination. The estimates indicate that approximately 2 million tonnes of chemical salts (comprising a range of chemical components/contaminants) will potentially be brought to the land surface as part of APLNG activities over the next 30 years. The average in the first few years will be around 73 000 tonnes per annum. By comparison a commercial solar salt field in Central Queensland produces some 230 000 tonnes per annum of salt.

³⁹ EIS: Volume 2, Chapter 12, Table 12.2. Hydrochemistry characterisation for the Walloon coal measures was provided in the EIS, Volume 5 Attachments Table 7.

⁴⁰ While Spring Gully is not part of the current proposal, it is indicative of variability in the chemistry of CSG water

⁴¹ Solids may be entrained sediments from wells, or of microbial origin



Table 7.7—APLNG salt production potential (TDS), based on projected CSG water yield volumes

CSG water extraction/production	Volume of CSG water	Volume of Brine ⁴²	Total Mass of Salts (TDS) ⁴³
Average annual yield for first 5 yrs - based on 120 ML/day (including current CSG water at Talinga WTF)	14 GL/year	1.4 GL/year	280,000 T
Peak yield in 2026 at 170 ML/day	49 GL	4.9 GL	197,000 T
Over 30 year life of project - based on 80 ML/day	661 GL	66.1 GL	2,640,000 T

Given the widespread nature of the potential footprint of the CSG industry, salinity risk will need to be managed at various levels.

APLNG CSG water—sodicity and the sodium absorption ratio

The Sodium Absorption Ratio (SAR) is a measure of the proportion of sodium relative to magnesium and calcium in water, and is one measure used to determine water suitability for agricultural irrigation. While an SAR range of between 6 -10 may be acceptable, the water is considered to be ‘sodic’, and can increase the exchangeable sodium percentage of the soil¹⁵. So in general, the higher the SAR, the less suitable the water is for irrigation on soils, and increased risks and impacts associated with soils of high clay content. The SAR of raw CSG water may range from 115 to 170 (refer Table 7.6), so over a long period of time can affect soil structure if continuously applied without prior water treatment to reduce salt levels.

APLNG CSG water—other contaminants

Certain other chemical constituents of the CSG water are present to varying degrees, and Table 7.8 indicates levels in comparison to water quality guidelines.

⁴² Assumes 90 per cent recovery of salts

⁴³ Assumes CSG water average 4,000 mg/L TDS,



Table 7.8—Indicative CSG water contaminant concentrations compared with aquatic ecosystem guidelines ⁴⁴

Chemical component/ contaminant	Production well concentration (P50) (mg/L)	ANZECC 2000 Water Quality Guidelines (mg/L)				NHMRC 2004 (mg/L)
		Aquatic	Irrigation (LTV)	Stock water Cattle	Stock water Sheep	Drinking water
Aluminium	0.050	0.027	5	5	5	0.055
Boron	0.255	0.09	0.5	5	5	0.37
Copper	0.030	0.0014	0.2	1	0.4	2
Iron	0.040	-	0.2	-	-	0.3
Manganese	0.030	1.9	0.2	-	-	0.5
Sodium	426	-	-	-	-	180
Zinc	0.010	0.008	2	20	20	3
Chloride	499	-	-	-	-	250
Nitrate	1.4	0.7	-	150	150	50
Sulphate	23	-	-	2,000	2,000	500
pH	8.1	-	6–8.5	6–8.5	6–8.5	6.5–8.5
TDS (salinity)	1,463	-	Crop/soil dependent	4,000–5,000	5,000–10,000	500

The yellow highlighted criteria indicate where CSG water contaminant concentrations exceed the contaminant guideline limits. For Drinking Water (NHMRC 2004) the criteria may be exceeded in respect of sodium, chloride, and TDS, however, the CSG would not exceed guidelines for sheep or cattle watering contaminant limits (ANZECC 2000) or long-term values for irrigation, except in terms of pH. Also, the stated contaminant concentrations of CSG water also exceed the ANZECC water quality guidelines for discharge to aquatic ecosystems in respect of some contaminants.

However, the EIS proposes that all releases to the open environment, whether to surface or groundwaters or to land will be treated before discharge, to relevant water quality standards.

Potential for CSG water to cause land contamination

Under state environmental legislation (EP Act), untreated CSG water is considered a ‘waste’⁴⁵ and a ‘regulated waste’⁴⁶. Further, under the same legislation, an owner or occupier of land is required to notify the administering authority (DERM) if they become aware that land has been or is being used for a notifiable activity (an activity mentioned in Schedule 3 of the *EP Act*). Notifiable activities identified in the EP Act are generally activities with the potential to cause contamination of land. The land is then recorded on the state’s *Environmental Management Register*.

⁴⁴ EIS Volume 5, Attachment 21, Ground Water Technical Report” Hydrology – hydrochemistry Characterisation, Section 7 Table 7

⁴⁵ Waste is defined in Section 13 of the EP Act. Waste includes any thing, other than a resource approved under EP Act subsection (4), that is— (a) left over, or an unwanted by-product, from an industrial, commercial, domestic or other activity; or (b) surplus to the industrial, commercial, domestic or other activity generating the waste. Waste can be a gas, liquid, solid or energy, or a combination of any of them. A thing can be waste whether or not it is of value.

⁴⁶ A regulated waste is waste that—(a) is commercial or industrial waste, whether or not it has



The EIS proposes that all releases to the open environment, whether to surface or ground-waters or to land, will be treated before discharge, to relevant water quality standards, and hence land contamination should be avoided.

7.4.2. Policy on coal seam gas water management

Government policy on coal seam gas development has evolved in recognition of resource development issues and wide stakeholder interests. It can be anticipated that as the CSG industry develops, policy development will reflect emerging issues and accommodate industry-wide management requirements.

In October 2008 the Queensland Government released the *Queensland Coal Seam Gas Water Management Policy*. The policy included, among other policy principles, the intention for a CSG Water Management Plan (CWMP) to be incorporated into the Environmental Management Plan (EMP) required for a level 1 environmental authority application.

Policy development has culminated in amendments to the EP Act through the *South-East Queensland Water (Distribution and Retail Restructuring) and Other Legislation Amendment Act 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:

1. the quantity of CSG water the applicant reasonably expects will be generated in connection with carrying out each relevant CSG activity
2. the flow rate at which the applicant reasonable expects the water will be generated
3. 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
4. the proposed management of the water including the use, treatment, storage or disposal of the water
5. 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:
 - a) the quantity and quality of the water used, treated, stored or disposed of
 - b) protection of the environmental values affected by each relevant CSG activity
 - c) the disposal of waste, including, for example, salts generated from the management of the water
 - d) 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*.

The guideline sets out preferred and non-preferred management options for CSG water. These are:

Category 1—preferred management options include:

- injection where detrimental impact unlikely
- untreated use where detrimental impact unlikely

been immobilised or treated; and (b) is of a type, or contains a constituent of a type, mentioned in schedule 7 of the EP Regulation. Waste prescribed under subsection (1) includes—(a) for an element—any chemical compound containing the element; and (b) anything that contains residues of the waste.



- treatment to an agreed standard for agricultural, industrial and potable uses

Category 2—non-preferred management options include:

- disposal via evaporation dams
- disposal via injection where detrimental impact is likely
- disposal to surface waters
- disposal to land.

The CSG water management options in each category are not in any preferred order. However DERM has specified acceptable criteria for certain uses of CSG water, in anticipation of the range of likely management options which may be available to producers and consumers in the CSG gas fields. These are known as ‘beneficial uses’, and the management arrangements are dealt with in the DERM guideline *Approval of Coal Seam Gas Water for Beneficial Use*.

This guideline describes the acceptable qualities for various beneficial uses such as:

- aquaculture
- coal washing
- dust suppression
- industrial use
- irrigation
- livestock watering.

7.4.3. Management of coal seam gas water by the proponent

APLNG has refined its proposed CSG water management strategy during the course of the EIS. Many of the changes have been influenced by submissions on the EIS and the development of the Queensland Government’s policy on CSG water. Comparison of the EIS infrastructure to the Supplementary information from the proponent indicates that the proposal could now have significantly less impact. For example, diagrams in the EIS indicated that over the life of the project there would be 50 water transfer stations and 10 water treatment facilities, whereas the revised planning indicates 17 transfer stations, 2 new treatment facilities plus augmentation of an existing treatment facility.

The APLNG proposal does not endorse discharge of untreated CSG water to land or water. This clearly necessitates effective treatment to standards required under conditions on an EA.

The EIS⁴⁷ stated that salts would be removed by reverse osmosis in the proposed water treatment facilities, and that the residual brine would have a salinity of about 60,000 mg/L. The average annual salt load would be 116,000 m³ (dry).

The first 5 years operational plan for the development would by 2014 require management of 100 ML per day CSG water generated by the proposed development, additional to the 20 ML per day currently generated at Talinga. Table 7.9 outlines the elements of the proposed water management plan for respective treatment facilities proposed in the first 5-year plan.

⁴⁷ EIS: Volume 2, Chapter3 Sections 3.2.8 and 3.2.9



Table 7.9—Proposed Gas-field principal water management plan

Water treatment facility	CSG Water volume	Permeate volume (beneficial use)
Reedy Creek	2013: 20 ML/day	Irrigation from January 2013 onwards with Interim river discharge during 2013. Total 36 ML/day
	2014: + 20 ML/day	
	Total 40 ML/day	
Condabri Central	2014: 40 ML/day	River discharge complemented with beneficial use, such as construction water and provision to existing agriculture.
	Total: 40 ML/day	
Talinga	2010: 20 ML/day	Existing 20 ML/d discharge to Condamine River complemented with beneficial use, such as construction water and provision to existing agriculture.
	2013: + 20 ML/day	New 16 ML/d discharge to the Condamine River complemented with beneficial use, such as construction water and provision to existing agriculture.
	Total: 40 ML/day	River discharge complemented with beneficial use, such as construction water and provision to existing agriculture.

The supplementary EIS information indicates that within the footprints of Reedy Creek and Condabri Central WTFs there could be some 370 ha of brine ponds associated with production of permeate suitable for beneficial uses. (The proponent has advised that the current brine pond facility at Talinga would not require expansion). Further discussion and evaluation on proposed brine ponds and brine evaporation basins is provided in the section below on CSG water infrastructure.

It is noted that the proponent is undertaking a wide range of investigations to provide a basis for determining the best options for beneficial use of permeate, including discharge to surface waters, irrigation and aquifer injection.

CSG water discharge to surface waters

The proponent has revised the arrangements for water treatment as described in the EIS and the current water management infrastructure proposals are summarised in Table 7.9. Permeate discharge priorities have not yet been assigned, although the proponent expresses preference for short-term and long-term discharge to surface waters where appropriate.

Based on the current proposal identifying 3 WTFs (Condabri, Reedy Creek and Talinga, each of capacity of 40ML/d with Talinga being an expansion from 20 ML/d), the corresponding permeate production would be Talinga: 36 ML/d, Condabri: 36 ML/d and Reedy Creek: 36 ML/d.

Management of CSG water could require provision of large off river storages as holding tanks sufficient for at least 100 days CSG water. The footprint of each tank could be in the order of 4,000 ML with a footprint of 20 hectares and that tanks would most likely be located close to watercourses.

The revised WTF arrangements include proposals to discharge permeate from:

- Talinga WTF to the Condamine River near the western boundary of the Talinga-Orana tenement,
- Condabri WTF to the Condamine River about 20 KM south of Miles
- Reedy Creek WTF to the adjacent Yuleba Creek.

A decision to authorise release of large volumes of water (permeate) into an intermittent river such as the Condamine River⁴⁸ would be taken by DERM having regard to criteria set out in the EP Act.

⁴⁸ Condamine River: The mean annual flow of the Condamine River measured at Chinchilla over 54 years of streamflow records (DERM gauge s Site 422308C) is 272,927 ML/year, However, the range of annual flows includes two years of zero flow (2004-5 and 2006-7) and 8 years when the annual flow exceeded 1.5 Gegalitres.



APLNG proposes a management regime for pulsed discharges of permeate, so as to reflect the natural hydrological regime of the receiving waters. In principle, this approach is supported, but only if it can achieve an environmentally acceptable outcome.

The EIS did not identify any ecological constraints that might arise from a proposed “pulsed” discharge regime that mirrored natural flow variability in the Condamine River. In this regard consideration must be given to potential ecological impacts (including the effects of cumulative discharges) on aquatic habitat including native fish breeding and feeding areas, potential for erosion and disturbance of riverine vegetation. Condition 4, Appendix 2, Part 2, has been set to reflect this point.

However, as there could be discharges from other proposed gas field developments that would affect this water balance, agreement should only be given to permit such a discharge if the cumulative effects of all the potential developments have been assessed in these terms. Condition 13, Appendix 1, Part 1 has been set requiring cumulative impact to be reported as a result of a general gas field cumulative impact condition.,,

Yuleba Creek and Condamine River are intermittent streams and DERM streamflow records show frequent periods of zero flow⁴⁹; The Condamine River has experienced two years of zero flow—2004-5 and 2006-7, and 8 years when the annual flow exceeded 1.5 GL⁵⁰). The EIS⁵¹ stated that the mean annual flow in the Condamine River at this point is 280,000 ML and if there had been no irrigation development the flow would have been 440,000 ML. Thus, the Condamine River flow could be enhanced by up to 160,000 ML at this point. Mindful that APLNG would be producing 13,100 ML per year (36 ML/d) of permeate at this point, volumetrically at least, the APLNG proposal would seem feasible.

The revised arrangements for the Reedy Creek WTF propose discharge priorities in the following order:

1. irrigation supply
2. irrigation storage
3. injection and making good excessive draw-down of landholder bores
4. construction water requirements
5. buffer storage.
6. Discharge to Yuleba Creek

It is noted that beneficial use of permeate from the Reedy Creek WTF is being trialled for irrigation of broad-acre crops including wheat, sorghum and mung beans. The irrigation management area would extend some 1,300 ha. A 2,500 ML water storage may be required.

Storage of large volumes of permeate is likely to be required in order to ensure that the pulsed releases of permeate can be managed to avoid adverse hydrological (and ecological) effects on the receiving waters.

It is recommended that permeate storages must be an integral part of CSG water management CSG water use.

The EIS⁵² provided the following estimates of water use during construction and operation of the gas fields.

⁴⁹ DERM http://www.derm.qld.gov.au/water/monitoring/current_data/site_details.php?site_id=422219A

⁵⁰ DERM http://www.derm.qld.gov.au/water/monitoring/current_data/site_details.php?site_id=422308C

⁵¹ Volume 5, Attachment 23, Section 2.1

⁵² EIS Volume 5 Attachment 21, Table 6.5



Table 7.10—CSG water use

Application	Element	Estimated total volume (ML)	Average daily rate (ML/day)
Construction	Brine pond	620	1.7
	Gas plant	365	1
	Water treatment facility	365	1
	Water treatment storage	90	1
Hydrostatic testing	APLNG pipeline	100*	NA
	Hi pressure network	0.3/km	NA
Dust suppression	During construction	87.6 per year	0.25
Drilling	NA	0.6 per well	0.64
Camp	Potable	0.15	0.15

*Water used for hydrostatic testing will be re-used where practicable.

The *Environmental Protection (Waste Management) regulation 2000* provides that CSG water is a regulated waste unless its use is authorised for a beneficial use, the terms of which are given in conditions of an environmental authority. Further, the supply of both treated and untreated CSG water outside of a petroleum tenure to a third party would also require either; the users to obtain a water licence; or petroleum tenure to register as a water service provider under the Water Supply (Safety and Reliability) Act 2008.

Clearly, the circumstances pertaining to any proposal to distribute CSG water on land must be properly assessed, safeguards adopted and the effects monitored.

Recorded groundwater salinities are highly variable, ranging from 250 to 16,000 mg/L⁵³. Table 7.7 of this report provides an indication of the variability of the hydrochemistry of CSG water. The CG is aware that salinity and other water quality parameters can vary within the various strata of the Walloon coal measures. It is concluded that uncontrolled release of untreated CSG water should not be permitted.

CSG water management infrastructure—Untreated water blending and brine ponds

The EIS stated that brine would be stored in fully engineered, purpose-built, lined ponds to further concentrate the brine by evaporation. The proponent’s commitments regarding lining of all brine ponds is supported. However, no details have been provided as to the technology and materials that would be applied to the task. Condition 9, Appendix 2, Part 2, has therefore been set requiring appropriate and effective under-liner drainage systems to be designed installed and maintained in a manner that prevents contamination of land and waters, for the life of all brine ponds..

It is also noted that as well as the brine ponds, several other ponds will be storing saline water that should not be released to the open environment, except under strict management. These ponds should also be designed to prevent leakage and monitored to permit auditing of the water balance.

Conditions have therefore been set, to require that all storages intended to hold raw (untreated) water, partially treated and blended water be considered regulated storages, regardless of size and contents, and be designed, constructed, managed, monitored, decommissioned and rehabilitated in a manner that:

- prevents contamination of land and waters
- conforms with best practice environmental management (as defined under the EP Act)⁵⁴
- conforms with appropriate technical guidelines and standards
- meets regulatory requirements. (Part 2, Appendix 2, Condition 9).

These requirements must be included and translated into effective auditable commitments (including measurable indicators) in the EM Plan.

⁵³ EIS Volume 5, Attachment 21, Hydrogeology – Hydrochemistry Characterisation, Section 3.7

⁵⁴ Section 21 of the EP Act defines the best practice environmental management of an activity as the management of the activity to achieve an ongoing minimisation of the activity’s environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity.



The EIS indicates that a brine concentration process would possibly not be necessary (or significantly reduced) if re-injection of untreated CSG water could be successfully achieved in an environmentally acceptable manner.

As part of justifications, it is expected that the land disturbance and volume of contaminated salts associated with brine ponds be presented to the EP Act administering authority; accompanied by quantitative data and calculations covering:

- all short and long-term risks
- potential impacts and costs associated with diminished land use
- remediation, rehabilitation, monitoring, structural failure, maintenance and ongoing management requirements associated with the proposed containment structures and their contents (including third party encapsulation, monitoring, maintenance and management costs into the future)

This information should be outlined in the Brine Management Plan to be provided as part of the EM Plan under Appendix 2, Part 2, Condition 6.

Leak detection and monitoring systems

The EIS⁵⁵ stated that the Environmental Plan structure incorporated an operational policy with measurable performance criteria for each element of the operation, together with monitoring, auditing, reporting and corrective action provisions. Details of these provisions were not provided. Thus, while the EIS stated that brine ponds will be designed to prevent any leakage, an appropriate and effective leak-detection and monitoring systems must be installed and maintained for the life of all brine pond. These requirements must be included and translated into effective auditable commitments (including measurable indicators) in the EM Plan. (Appendix 2, Part 2, Condition 9)

Pipelines

Water pipelines comprise water-gathering lines, water trunklines and a central water collection header arterial pipeline.

Water-gathering lines connect wells to infield buffer storages and regional storage ponds. These pipelines would be of high density polyethylene (HDPE) material, buried within 18 metre-wide easements by trenching operations that will, where possible be co-located with the gas gathering pipelines.

The location of a beneficial use may be some distance from the WTF.

Following treatment at the WTF, permeate will be directed to a point of discharge for a beneficial use. This may (as previously discussed) be a holding pond or a well head for re-injection where the beneficial use is recharge of an aquifer.

To transfer associated water to the WTF there will be some 600 kilometres of trunk line with diameters of 300 and 1,200 mm. Where feasible the trunk lines will be co-located with gas trunk lines. Easements for co-located pipelines will vary between 20 and 54 metres.

Water transfer stations

Where changes in elevation so demand, water transfer stations will be constructed to assist in pumping water to the nearest WTF. Each Water Transfer Station (WTS) will typically comprise of a lined, fenced holding pond and a pumping plant that will include a small power generator located on a 200 m x 300 m pad (6 hectares).

⁵⁵ EIS volume 2 Chapter 24, Table 24.1



The EIS provided an estimate of 33 WTS would be required in the first 5 years of the project. However, the proponent subsequently advised a refinement of the planning in the supplementary EIS information indicating there will now be 17 water gathering stations and 2 water transfer stations and that power demand will typically be in the range of 630 kW and 750 kW per pump to transfer water between major sections of the water management system 24 hours a day, seven days a week. If treated CSG water is used for irrigation, further pumping stations will be required. Pumping stations will be capable of pumping approximately 3 to 4 ML per day per pump. Wherever possible, all motors and pumps will be located undercover.

Infield pumps would be powered by stand-alone gas or diesel generators. Alternative connection to the grid via a transmission line connected to the FCS may be possible in the future. This would involve an underground 11, 22 or 33 kV transmission line located in the same easement as gas and water gathering lines. The total length of transmission lines could be approximately 600 km.

Beneficial uses for CSG water management

As described in section 7.4.3 above, a number of “beneficial uses” for treated CSG water are recognised by the DERM Guideline *Approval of coal seam gas water for beneficial use*. The following discussion indicates the options from which APLNG will chose its various disposal strategies, in an adaptive management program. These will be in addition to the principal water management plan outlined above in Table 7.9. Because these are standard “beneficial uses” they can generally receive approval provided they meet the water quality criteria and usage procedures that are contained in the guidelines.

The following uses are envisaged, together with the nature of the APLNG facilities corresponding to the use.

Dust suppression

The EIS⁵⁶ stated within the description of the EM Plan for the project that “Associated water used for dust suppression will meet statutory water contaminant release limits”.

Table 7.10 above provides an estimate of the volume of CSG water that may be required for dust suppression. However, the EIS does not specify the location of land that may be irrigated with CSG water for ‘dust suppression’ purposes or application rates.

Reference should be made to the DERM guideline *Approval of coal seam gas water for beneficial use*, which states that significant damage to soil structure and function can occur as a result of incompatible water-soil interactions, and repair of the soils may take decades or may not be possible at all. The guideline also states that the use of CSG water for dust suppression is considered to be ‘small scale irrigation’, and that the ‘over-application of CSG water’ (i.e. that could be seen as disposal) is not considered a ‘beneficial use’.

The guideline states that minimum standards of use of CSG water for dust suppression include a maximum SAR of 15 and an electrical conductivity (salinity) of 3,000 uS/cm. The application of this guideline indicates that APLNG CSG water will need treatment before ‘beneficial use’ approval as a dust suppressant at any particular location.

When APLNG elects to manage water by ‘beneficial use’ of CSG water for ‘dust suppression’ purposes, it will require an approval for beneficial use under section 13(4) of the EP Act and Part 6A of the *Environmental Protection (Waste Management) Regulation 2000*. The EP Act administering authority will decide matters related to use of untreated CSG water for ‘dust suppression’ purposes in a manner that prevents serious and material environmental harm and in accordance with the principles of ecologically sustainable development.

⁵⁶ EIS Volume 2, Chapter 24 Table 24.13



Crop irrigation

The EIS stated that current land use in some parts of the gas fields includes irrigated cropping using groundwater. Approximately 99,500ML/a (80 per cent) of licences in the vicinity of the proposed gas fields are associated with the groundwater supplies from the shallower aquifers (in the Cainozoic Units). Aquifers in the lower geological measures (including the Walloon coal measures) are generally used for stock water—not irrigation, due to the nature of the higher salt content. Approximately 27 per cent of existing bores in the gas fields access the Walloon Coal Measures.

Soluble salts reduce the availability of water to plants, and according to the ANZECC⁵⁷ guidelines, the only plants suitable for irrigation with water above salt concentrations (TDS) of 1,940 mg/L are ‘*salt tolerant*’ and ‘*very salt tolerant*’ plant species.

Table 7.6 of this report indicates that the CSG water sodium absorption ratio could range from 115 to 170. Unless the CSG water is suitably treated, application of water with such high SAR could cause irreparable damage to soils.

While the hydrochemistry of an average CSG water sample from the Walloon coal measures, shown in Table 7.6 of this report, indicates that there would be no long-term issues with use of CSG water for irrigation, it is noted that groundwater quality is highly variable and that in all cases proposing supply of CSG water for irrigation the CSG water chemistry must be matched to the soils and plant tolerances.

Such soil assessment is envisaged by the DERM Guideline in support of any application for consideration of a crop irrigation project.

It is noted that the project footprint and vegetation clearing estimates presented in the EIS do not account for land that might be developed for CSG water irrigated crops.

If the proponent does proceed with broad-acre irrigation any proposal to clear remnant vegetation or sensitive habitat areas for that purpose would not be supported.

Irrigation of tree plantings

The proponent is undertaking irrigated tree planting (*Pongamia* spp.) trials near an existing CSG development in the Spring Gully area. This has received DERM approval as a “beneficial use” irrigation project. The trials are intended to assess the impact to soil and drainage profiles from treated and untreated or blended CSG water via irrigation. The amount of make-up water that would be required for blending would depend on the salinity of the CSG water in that location and the salinity of the make-up water.

DERM has roughly estimated that if the proponent used a water supply, for example, a starting salinity of 1000 mg/L and assume that half the volume of salt is NaHCO_3 (i.e. sodium bicarbonate) and the sodium bicarbonate is neutralised with H_2SO_4 (i.e. sulphuric acid), we produce Na_2SO_4 (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 ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) will add approx. 20 per cent of additional solids. Therefore to estimate the final salt volumes, an assessment of the CSG water salt volumes (produced from gas field groundwater) must allow for a 20 per cent increase multiply to account for the “amendment” process.

Issues associated with application of CSG water to land have been discussed previously in this report. Consideration must also be given to land-use issues that would be adversely impacted if the trials, and ultimately if a decision is taken to commercialise trial successes, were to be extended over lands with remnant ecosystems.

As noted in the previous section, no consideration has been given to development of irrigation areas in accounting for the project footprint and vegetation clearing estimates presented in the EIS. If the proponent does proceed with irrigated tree planting, any proposal to clear remnant vegetation or sensitive habitat areas for that purpose would not be supported.

⁵⁷ Australian and New Zealand Environment and Conservation Council



As stated previously, it is important to avoid the potential for widespread, irreversible, serious environmental harm associated with the widespread application of highly saline and sodic water due to the potential for movement of those salts and displaced clay particles. Long-term environmental impacts and economic loss consequences may result. The potential for environmental harm must be formally resolved before reliance can be made on irrigation as a management solution for CSG water.

Without irrigation design details specific tree planting irrigation projects cannot be endorsed as a complying beneficial use. The DERM Guideline, in any case, requires a soil analysis and irrigation assessment of any agro-forestry proposal. It is recommended that the proponent must provide detailed information to DERM as part of the EM Plan in support of the EA application for such an irrigation project.

'Beneficial use' of CSG water for crop and tree planting irrigation purposes will require an approval for beneficial use under section 13(4) of the EP Act and Part 6A of the *Environmental Protection (Waste Management) Regulation 2000*. The Coordinator-General is confident that the EP Act administering authority will decide matters related to use of CSG water for irrigation purposes in a manner that prevents serious and material environmental harm and in accordance with the principles of ecologically sustainable development.

CSG water—beneficial discharge for town water supply

Drinking water and recycled water is regulated under the *Water Supply (Safety and Reliability) Act 2008*. It is a risk-based management approach that requires a Drinking Water Quality management plan (DWQMP) or a Recycled Water Management Plan (RWMP) and other regulatory mechanisms. Water quality standards are set by Queensland Health (Public Health Regulations) and DERM (regulatory guidelines and approval conditions).

All proposals that would result in permeate directly or indirectly augmenting a town water supply will be subject to legislative amendments that took effect in September 2010. (It should be noted that the new regulations also control discharges to groundwater injection where an aquifer is utilised for town water supply).

The requirement to prepare a RWMP would be determined by the Regulator, having regard to the potential for material impact on the raw drinking water supply source.

CSG water—groundwater re-injection

APLNG has identified that treated CSG water could potentially be injected directly into deep groundwater formations below the APLNG well field areas and injection trials are currently being conducted to assess the potential in terms of flow rates (and volumes) and transmissivity (the potential for unintended flow into other aquifers). It is considered that injection of suitably treated CSG water should be accorded high priority, if specific beneficial surface water allocations as discussed above, cannot be settled.

CSG water—cumulative impacts

DERM advises that the cumulative impact assessment for CSG water only includes gas fields that are part of APLNG - it does not include APLNG gas fields which have existing approvals. APLNG has not indicated an inclusion of the amount of CSG water that will be generated by the QCLNG or Arrow Gas Fields in the vicinity of APLNG's tenements. Therefore, it is not possible to determine whether the total amount of CSG water produced for a given area can be beneficially used or disposed of in a way that meets suitable environmental standards. For example, where multiple CSG water discharges are proposed to the same watercourses such as the Condamine River, the EIS has not addressed the cumulative effects. Cumulative impacts to receiving waters are matters to be addressed by DERM when considering applications for EAs. As previously indicated Condition 13 Appendix 1 Part 1 has been included to examine cumulative water disposal issues as part of the general gas fields..



CSG water management plan

It is noted that the draft EM Plan prepared by the proponent and included in the EIS incorporates a management structure for “associated water” (CSG water). The structure follows the proponent’s Health, Safety and Environment Management System that is stated to be consistent with ISO 14001—Environmental Management Systems. Implementing the Environmental Management System consistent with ISO14001 will provide the proponent with appropriate mechanisms for performance measurement and amendment of practices through a continual improvement process.

The EIS stated that management of CSG water is based on an adaptive approach to beneficial use opportunities, developed in conjunction with other CSG water producers. To this end APLNG has proposed establishment of a task force, with membership by DERM, GLNG,, QCLNG, APLNG and Sunwater to address emerging CSG water management issues.

It is noted that the proponent has specified in the EIS priorities for beneficial application of CSG water. These priorities generally align with the Government’s policy on CSG water.⁵⁸ However, the proponent has not decided to adopt specific options for beneficial use of permeate. In any case assessment of these priorities would be determined by DERM, having regard to the environmental, resource and social constraints of specific sites. This evaluation is therefore limited to the matters discussed in this report.

7.4.4. Coordinator-General’s conclusions

Water production volumes reflect an ongoing trajectory of gas well development (and consequent build up of water to a peak in 2021) over a field life of 30 years. Hence, information has been presented on global water production over the whole project, while more detailed infrastructure plans have been provided for the initial 5 year development program, in the particular for gas field areas which will be developed first.

The government has nominated a coal seam gas water management policy program which deals comprehensively with acceptable water management arrangements and acceptable environmental and resource criteria, to ensure that a project proposal can be considered and assessed within the framework.

The project’s water management issues for the whole project can therefore be broadly assessed, while specifically considering the more detailed plans envisaged in the first 5 years of field development. Observations have been made in the above sections on the various water quality, management and beneficial use proposals and options, which the project has described in its EIS and supporting material.

Firstly, in considering the scale and extent of water production from the project’s field development plans over 30 years it is noted that significant, but not unmanageable, quantities of salts will be generated; uncontrolled discharges should therefore not be permitted to the environment over the long term.

Secondly, the project’s policy to treat CSG water by reverse osmosis to yield permeate that contains about 10 per cent of the salts contained in the groundwater supports a view that the proponent would be capable of meeting all of the water quality requirements envisaged for the range of ‘beneficial uses’ set by DERM

Provided the proponent submits proposals for beneficial use of permeate, which comply with the guidelines, and commits to implementation in accordance with those guidelines, the EP Act administering authority will decide matters related to use of CSG water for beneficial use purposes in a manner that prevents serious and material environmental harm and in accordance with the principles of ecologically sustainable development.

Specific conditions have been set to ensure that the proponent maintains adequate measures to support objectives of the government’s CSG water management policy. These involve conditions on construction of brine containment ponds, recognition that all beneficial use applications will be dealt with on a case-by-case basis under the EP Act in accordance with published guidelines, and that use of treated water for town water supply will be regulated under Water Supply Act and Regulations.

⁵⁸ DERM: Coal Seam Gas Water Management Policy, June 2010



It has been noted that APLNG proposes a management regime for pulsed discharges of treated water to certain watercourses, so as to reflect the natural hydrological regime of the receiving waters. In principle, this approach is supported, but only if it can achieve an environmentally acceptable outcome. It is noted that the proponent does not intend to construct any untreated water storage ponds for the specific purpose of evaporation. The proponent's commitment regarding this matter is consistent with Queensland government policy.

As regards the initial 5-year plan for CSG water management, it is noted that APLNG proposes:

- to treat CSG water by reverse osmosis
- to contain brine in engineered water ponds, and as the major initial strategy
- to discharge treated waters into suitable watercourses under controlled conditions, generally in a way which is envisaged under one of the "beneficial uses" contained in the relevant DERM Guideline.

In principle, this strategy would appear to be consistent with the following guidelines, policy and legislation dealing with CSG water management:

- the Queensland Government's policy on Coal Seam Gas Water Management
- DERM Guideline: Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities
- DERM Guideline: Approval of coal seam gas water for beneficial use
- the *Environmental Protection (Waste Management) Regulation 2000*
- DERM Healthy Headwaters study: Characterisation of salinity limits related to the use of CSG water for irrigation (DERM, January 2010)
- the passed EP Act amendments contained in the *South-East Queensland Water (Distribution and Retail Restructuring) and Other Legislation Amendment Act 2010*
- other statutory requirements, including but not limited to: the requirements of the *Water Act 2000*, *Water Supply (Reliability and Safety) Act 2008* or proposed amendments and the *Public Health Regulation 2005*.

In order to ensure that the full detail does indeed conform to the policy, the proponent is required to submit to DERM a CSG Water Management Plan, in accordance with the recently enacted legislation, with its EM Plan to support its application for Environment authorities for the gas fields. The proponent is also required to present a separate Brine Management Plan at the same time, to ensure that special consideration is given to the longer term management of this water product. These matters are contained in Appendix 2, Part 2, Conditions 4 and 6.

While the CSG Water Management Plan (CWMP) identifies the management structure and the suite of options that would set the agenda for resolution of management issues, outcomes in an adaptive system will, by definition be the result of decision-making taken on a case-by-case basis, having regard to stakeholder inputs and iterative site and activity assessments.

The key elements of the proponent's CWMP appear to be consistent with the statutory requirements listed above.

Further information is required to assess the cumulative effects of interactions between adjacent projects that have potential for increased effects. Cumulative discharges to surface waters such as the Condamine River and to injection of permeate into aquifers may be cumulative as a result of actions planned in other gas field developments. These matters are expected to be addressed by DERM and the Queensland Water Commission and appropriate limitations placed on proponents through conditions in issued environmental authorities.

It is noted that the Commonwealth has also adopted an adaptive approach to CSG water management and in its approval of the GLNG and QCLNG projects on 22 October 2010, has set conditions on those projects in accordance with that adaptive framework to protect matters of national environmental significance. It is considered that the Commonwealth's approach is fundamentally similar to that of the State with a mix of management options including treated discharge to water courses but with a preference for aquifer reinjection in the longer term should drawdown trigger levels be reached in aquifers adjacent to the Walloons.



7.5. Groundwater

7.5.1. Monitoring the effects of gas field activities on groundwater supplies

There has been extensive public discussion of the potentially adverse impacts of CSG water extraction on other groundwater aquifers. Submissions on the EIS also sought clarification of the 'make-good' provisions where draw-down of aquifers is evident. In this regard the water supply failure could be due to a number of issues, including:

- groundwater extraction (and CSG water associated with the development of the gas field)
- potential disturbance of the aquifers through activities including fracking and cavitation
- water quality changes through mobilisation of contaminants.

Submissions on the EIS identified major issues in local government and in the community about the belief that dewatering the coal seams could adversely affect aquifers and production bores throughout the Surat Basin. The landholder interests are likely to become more acute as the intensity of the gas field development increases.

Agency advice

In mid-2010, the Department of Environment and Resource Management (DERM) issued advice on the Environmental Impact Statements for the QGC and Santos projects. Since providing this advice, progress has been made in understanding the scope of the possible impacts on aquifers of the GAB due to CSG activities. The groundwater modelling undertaken by APLNG together with the supplementary information provided, has better defined the potential impacts.

Groundwater modelling

The development of a comprehensive groundwater model is dependent on calibration by an extensive and thorough groundwater level monitoring program in all aquifers. To be effective the monitoring must commence in advance of gas production and continue as gas production proceeds. Monitoring must also continue beyond extraction to monitor the recovery of the groundwater system. Given that the groundwater modelling (see **Impact on groundwater resources**, below) projects that the maximum effect of groundwater extraction would occur in the year 2049 with the Walloon Coal Measures and later within other aquifers

DERM stated that APLNG has proposed a groundwater monitoring program, based on high risk areas identified by its modelling to date. The monitoring will be for water levels and for water quality parameters and will help to better understand the water dynamics in the GAB. The program is designed to determine baseline conditions prior to CSG production, and will use existing bores and establish new monitoring bores. APLNG advises it has adopted a two-tiered approach to monitoring viz.: to engage proactively with landholders if changes are detected and could occur to their bores; and to respond if landholders raise issues about impacts to their bores. The program is designed to complement DERM's monitoring network, particularly in the Cainozoic (Condamine alluvium) formations.

Amendments to the regulatory framework for managing groundwater impacts are currently being proposed. Under the proposed arrangements a petroleum tenure holder will have an obligation to develop and implement a monitoring strategy. If the proponent is in a Cumulative Management Area then it is proposed the strategy will be developed by the Queensland Water Commission. It is also proposed that the QWC will also identify specific monitoring obligations for individual tenure holders.

DERM has advised that APLNG has adopted a sophisticated finite element numerical model (FEFLOW), to deal with complex hydrogeology, including variable bed thickness and hydraulic properties both laterally and vertically. The model incorporates the proposed timing for various developments. The model included a small-scale transient calibration (at Talinga for 2005-2009).



The QWC will be empowered to develop a regional groundwater model framework incorporating all work to-date and with a focus on modelling cumulative impacts within a declared cumulative management area. It is anticipated that the regional groundwater model will incorporate all the gas fields located within the Surat Basin. The regional groundwater model will be used to predict collective impacts of CSG water extraction on water levels and help the design of the future water level monitoring network and management responses. The model will integrate the work already carried out by individual companies. It is anticipated that the model will be completed in mid 2011—but could be available earlier.

Springs

DERM advises that APLNG has presented a summary of an assessment of potential impacts to springs and associated groundwater-dependent ecosystems. These are of particular interest because of their possible inclusion as ‘matters of national environmental significance’ under the Australian Government’s EPBC Act. APLNG advised that there is only one recognised spring within APLNG’s gas fields’ tenements. It is advised that field investigations could not identify any evidence of groundwater dependent vegetation at the site.

DERM also advises that APLNG has undertaken a preliminary conservative assessment of river reaches where potential groundwater baseflow could occur within the gas fields’ tenements. This is being refined using field studies and remote sensing.

There are a number of springs on the register located in the Surat North and Surat Management Areas. The register maintains a list of springs for the purpose of implementation of the Water Resource (Great Artesian Basin) Plan 2006. These are described in the publication Great Artesian Basin Water Resource Plan: Ecological Assessment of GAB springs in Queensland (Fensham & Fairfax 2005) and The AGE Report (2005) on potential river base flow and springs from aquifers of the Great Artesian Basin.

In the proposed regulatory framework under the *Water Act 2000* for managing groundwater impacts, proponents will have an obligation to undertake an assessment of all springs within an area of likely to have a 0.2m drawdown, and accordingly propose and implement a strategy to minimise or mitigate impacts on these springs. The new regulatory framework provides for a risk-based adaptive management approach to spring impact management.

Injection into aquifers

DERM advises that injection of CSG water to aquifers could be viewed in two contexts. Firstly it may prove to be the best approach to mitigating significant water level drawdowns associated with CSG production. Secondly, it may prove to be the best approach to disposing of unwanted CSG water.

Clearly there are several advantages in pursuing injection as the primary means of managing CSG water. APLNG has identified that these advantages include: mitigating adverse impacts on aquifers and reducing potential ‘make good’ requirements for production bores and springs by re-establishing groundwater levels; reducing storage pond requirements and the associated surface impact; and contributing to a sustainable approach though storing water for future use.

DERM’s preference is that injection of treated CSG water should be the first priority in the disposal/management of this water. The aquifers selected for this injection should firstly be those currently under stress from over-extraction. The quality of the water to be injected also needs to not put public health standards at risk with regard to urban drinking water supplies.

Impact on groundwater resources

In its supplemental information APLNG presented a series of projected drawdown plots for the Taroom Coal Seam (near the base of the target Walloon Coal Measure) because this is where the greatest magnitude of drawdown will be experienced. It was suggested there could be a 20-year lag from maximum extraction before the maximum drawdown occurs and this will not be uniform between different aquifers. Peak water production is expected to occur in 2020 and the projections were for the year 2049 (the year the maximum effect of groundwater extraction occurs in the Walloon Coal Measures (WCM)).



DERM notes that APLNG has advised that the magnitude of the depressurisation could be several hundred metres within the WCM, although this is understood to likely be relatively localised to where the coal seams dip to up to 800m deep. It was reaffirmed by APLNG that all existing water production bores in the WCM may, in effect, be lost (or significantly affected) and will have to be 'made good'.

As far as adjacent aquifers are concerned on average, the groundwater level drawdown is projected to be approximately 15m across the cumulative CSG development areas and their proximities. However, localised areas of greater drawdown are projected, these being generally concentrated in areas where both the coal seam elevations are comparatively deep and the Upper Walloons unit aquitard (separating the Springbok Sandstone and target coal seams) is inferred to be thin. (Note: The QGC modelling estimated maximum drawdown in the Springbok formation above the WCM to be of the order of 80m).

At a higher level, small amounts of drawdown are expected to occur in the shallower Gubberamunda Sandstone/BMO Grouping and near-surface Cainozoic Units. Upon completion of CSG development, water levels in the various aquifer intervals will recover towards baseline conditions—although this will take many years.

According to APLNG's information the Hutton Sandstone, which is situated beneath the WCM, and separated from it by a lower permeability unit, is expected to experience comparatively less drawdown.

Current information suggests that while there is a potential for interconnectivity between parts of the Condamine River Alluvium and the underlying Walloon Coal Measures, as identified by a September 2010 Expert Report the actual degree of interconnectivity needs to be better understood through on-going monitoring.

APLNG proposes to apply the early warning monitoring approach and focus on the Springbok Sandstone. If a trend outside expected variability is detected, they expect there will be an opportunity to implement corrective measures well before the effect is seen in the shallower and more important aquifers in this region. It is noted that APLNG has committed that all potentially affected water users will be consulted and those affected will be compensated through 'make good' provisions.

APLNG has noted that most of the existing water bores within the WCM are located in the shallower parts of the aquifer outside its gas field tenements. APLNG believes that due to the proposed phased development of its gas fields, they will have time to enhance their groundwater model and incorporate monitoring results and 'make good' options. This includes the possibility of taking opportunities to replace some of the lost water with CSG water.

Notwithstanding the above, it would appear to DERM that while APLNG (and all other CSG producers) may be able to effect 'make-good' actions of one form or another to the satisfaction of the QWC and local landholders, an issue identified by State (and Commonwealth) agencies is what the implications of an extensive depressurisation of several hundred metres might be for the WCM and its adjacent aquifers. The possibility arises that a major drawdown area may occur where an aquitard is thin, but if there are no production bores or springs in this area the 'make-good' provisions would not be triggered. This could have wide-ranging impacts on water levels in various aquifers in the area and leave an adverse legacy.

DERM stated that it is not aware of head differences of several hundred metres between aquifers in any aquifer sequence anywhere in the world. These levels are greater than DERM has experienced to date—for instance, it is greater than the drawdowns that have been the basis of the development of the GAB Sustainability initiative (GABSI). Hence it is not possible to define the magnitude of an acceptable contingency trigger (a 'rate of drawdown' trigger) at least until the QWC's cumulative groundwater modelling outcomes are known.

Even when CSG proponents provide all the data and assessment that could be provided at this point of time in relation to impacts on water levels, it has to be accepted that it is not possible to know the full extent of the likely impacts on water levels. Any path forward has to involve monitoring and using monitoring data to predict any difficulties occurring, and then an appropriate path of response. It should also involve a strategy for responding to material/major unforeseen impacts.



It is expected the proponent's management responses to any emerging major impacts would include far-reaching solutions. Given the uncertainty in the situation, an appropriate response could range from: offset arrangements; reinjection; the modified scheduling of gas fields to be developed; and the reduction or even the possible shut down of certain areas of CSG extraction operations. The commitment by the proponent to implement these management responses should not just be for over the life of the project but also for many years beyond, as relevant. This may also mean that it may not be possible to return to certain areas of the gas fields to extract more gas through stimulation, and it may also mean that the gas fields in areas where the aquitards are known to be of limited effect (or found in future to be so) should be avoided. Temporal and spatial scales will be a major consideration. The full range of responses needs to be anticipated by the proponent as possible future requirements.

The approval provides for ongoing adaptive management by providing that EAs include conditions about adaptive management in relation to the impact of groundwater extraction.

Proponent's response

The EIS⁵⁹ provided a strategic approach dealing with monitoring, management and mitigation of any adverse effects. APLNG recognizes that groundwater level drawdown in water-bearing intervals outside of the Walloons Coal Measures is a potential project effect. To address this potential issue, APLNG has proposed establishing regional groundwater monitoring for a number of key Great Artesian Basin (GAB) aquifers, sub-artesian aquifers and shallow alluvium aquifers.

APLNG advised that its network will include a large number of pressure monitoring bores within the Walloon Coal Measures (WCM) from which the CSG is sourced. The monitoring will be set up as an 'early warning' system so that if unexpected changes in water levels outside natural fluctuations are detected, it will enable investigation and, if necessary, corrective action to occur.

To identify the possible cumulative impacts of drawdown due to various major CSG operations APLNG has also undertaken groundwater modelling based on the publicly available data and certain assumptions. Notwithstanding this comprehensive modelling approach APLNG acknowledges there is inherent uncertainty with groundwater systems and modelling of potential impacts.

APLNG is also initiating or exploring a number of pre-emptive mitigation measures to reduce the risk of effects to regional and local groundwater resources including:

- feasibility studies for the injection of associated water to mitigate drawdown effects in GAB aquifers and help re-equilibrate the basin water levels
- implementation of a CSG well completion design that ensures hydraulic isolation between the Walloons Coal Measures and aquifer zones above
- sacrificing of coal seams in the upper part of the Walloons Coal Measures where the thickness of protective aquitard has been demonstrated to be reduced and risk to drawdown to the overlying Springbok is higher.

In addition to the modelling and monitoring commitments made, and pursuant to the Petroleum and Gas Act, APLNG will be required to 'make good' any adverse effects to water bores due to reduced groundwater production capability that is demonstrated to be an effect of its development activities. Actions to make good would follow appropriate consultation and agreement with relevant stakeholders.

The proponent has compiled information on all registered bores, identifying the aquifers used, the water extracted and the purpose of the water supply. Private bore records in many cases have provided an historic record of seasonal influences on the aquifer systems that are recharged from rainwater, river and flood percolation.

The extent of aquifers beneficially used by local governments and landholders in the gas fields have been identified as follows:

- Mooga Sandstone—utilised for stock and domestic supply.
- Gubbamundra Sandstone—utilised for stock and domestic supply.
- Springbok Sandstone—widely used in the GAB for stock and domestic supply.

⁵⁹ EIS Volume 2, Chapter 10, section 10.5



- Walloon Coal Measures—these include inter-bedded layers of some areas of argillaceous sandstones that form part of the GAB are used for stock and domestic supply.
- Hutton Sandstone (Marburg Sandstone)—widely used at its shallower depths of the GAB.

The purpose of monitoring is principally to set trigger points for action to be taken if the CSG extraction results in drawdown of the upper aquifers. The triggers are specified in two ways where the effect is attributable to the CSG extraction:

- for surficial (surface related) aquifers such as alluvium: the lesser of a 2 metre drawdown and a 10 per cent reduction in the available water column
- for consolidated aquifers (including sandstone and all other non-alluvial aquifers) the lesser of a 5 metre decline and a 10 per cent reduction in the available water column.

Immediate actions that need to be taken when a trigger point is reached include:

- identification of the specific bores likely to be affected
- assessment of factors that may have contributed to the monitored drawdown (including seasonally low rainfall, CSG water extraction and non-CSG water extraction)
- assess whether the water supply failure has affected the function of the bore
- report to landholders
- report to DERM.

APLNG has stated that it considers it very unlikely any discharge springs occur within the area of potential drawdown from their CSG activities. They advise that the closest registered discharge springs are at the Eulo springs complex, which is located approximately 500 km southwest of the gas fields. APLNG has assessed that a basin ridge separates the Surat Basin from the Eromanga Basin, which, it is argued, further protects the springs from any impact due to drawdown or changes in water quality.

APLNG has discussed its aquifer injection trials (approved by DERM), which are currently based on injection of treated CSG water from reverse osmosis plants (permeate). APLNG has stated that the trials are still at an early stage and advises that the geology in the basin is not as favourable to injection compared with some other places in the world where injection is widely used. The best aquifers are quite deep (up to 1500m) from where the larger water allocations are taken.

APLNG also noted that in regard to available water quality, injection is not straight-forward as it is necessary to match injected water with in-situ water quality to avoid potential chemical precipitates forming, which could reduce permeability of the aquifer. All water will be treated before injection. However, depending on the quality of the receiving water, APLNG advises it might propose mixing some of the raw water supply or the brine stream into the injected water—provided this can be done without risk to public health. Injection back into the coal measures could impose limitations on the extent of injection to areas, but this was subject to further studies.

Where higher water quality standards than the national water quality guidelines are required by Queensland Health this could limit injection in places where the water could directly or indirectly be used for urban drinking water supply.

Notwithstanding these potential difficulties APLNG advises that injection is likely to be part of the CSG water management mix of options deployed.

7.5.2. Groundwater legislation and policy

Progress has been made on groundwater policy reform. The provisions relating to underground water management (including the 'make-good' provisions) are to be relocated from the *Petroleum Act 1923* and the P&G Act (Petroleum legislation) to the *Water Act 2000*. The provisions of the *Water Act 2000* will also be expanded to provide for the Queensland Water Commission (QWC) to manage groundwater monitoring and develop regional groundwater models for declared cumulative management areas.

Amendments to the *Water Supply (Safety and Reliability) Act 2008* are also being proposed. These amendments provide purpose built rigorous requirements for CSG water impacting on the drinking water supply sources of a drinking water service provider, to protect public health and to provide public assurance that public health is being protected.



The Government is improving public access to groundwater information by establishing an on-line information portal. The portal will provide the latest information on groundwater monitoring bores located in the Surat and Bowen basins. Amendments to the regulatory framework for managing groundwater impacts are currently being proposed. Under the proposed arrangements a petroleum tenure holder will have an obligation to develop and implement a monitoring strategy. If the proponent is in a Cumulative Management Area then it is proposed the monitoring strategy will be developed by the Queensland Water Commission. It is also proposed that the QWC will also identify specific monitoring obligations for individual tenure holders.

Until the Queensland Water Commission's role in ground water modelling is operational, the CG will receive ground water monitoring reports relevant to gas field development proposals.

In the proposed regulatory framework under the *Water Act 2000* for managing groundwater impacts, proponents will have an obligation to undertake an assessment of all springs within an area of likely to have a 0.2m drawdown, and accordingly propose and implement a strategy to minimise or mitigate impacts on these springs. The new regulatory framework provides for a risk-based adaptive management approach to spring impact management.

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, at the location of a water supply bore, if the impact on water levels is such that 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 and 'make good' the situation. The bore owner would need to provide information to the CSG producer in relation to the extent of reduction. If the bore owner is dissatisfied with the outcomes of the negotiations with the CSG producer in relation to impacts on bore supply and 'make good' actions, the bore owner will be able to appeal to the Land Court. Under the new arrangements, the predictive trigger threshold values for impacts on bores will be a 5 m drop in standing water levels 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*. If the Queensland Water Commission predicts that groundwater impacts may exceed these trigger values, it will be cause for immediate responses by government and gas producers to adjust groundwater management regimes.

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; projections 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. DERM advises that the Surat Basin is likely to be a single 'cumulative management area'.

7.5.3. Coordinator General's conclusions

Drawdown of the CSG aquifer is integral with development of the gasfield and extraction of CSG. However, the effects that this may have on other aquifers are largely unknown. For this reason monitoring of aquifers likely to be affected is an essential component of the environmental management of the gas fields.



The proponent has estimated the quantity of CSG water that will be extracted during the first 5 years would approximate 120 ML/d in 2013–2014. The EIS also indicates that the peak production of CSG water would rise to around 170 ML/d later in the development, and that over the life of the project more than 1000 GL could be extracted. DERM raised the issue that if the Walloon coal measures are proven to be inter-connected to higher alluvial strata, then the potential for long-term changes to land uses that rely on groundwater must be considered. Further, drawdown of the aquifers in the alluvial strata might induce change in surface water percolation rates in groundwater recharge areas.

These points are included in the reasoning for the appointment of the Queensland Water Commission as the agency which can take an overview monitoring role, and investigate and predict potential for future impacts on a scientific basis.

The key issue associated with the management of CSG activities to prevent adverse effects on existing groundwater use is monitoring. With historical information and current monitoring data the proponent will be well placed to act before failure of quantity or quality of water supplies that are essential to some land uses.

The groundwater monitoring data will also provide input to auditable reports to confirm the effectiveness of operational activities.

It is noted that the proponent has undertaken pre-emptive actions to establish baseline bore monitoring to create a database for management.

With the above issues in mind, the Coordinator-General confirms the need to monitor aquifers likely to be affected as an essential part of an adaptive Environmental Management Plan for the CSG field that will form part of the application for the Environmental Authority. The relevant conditions are contained in Appendix 2, Part 2 (Conditions 10 and 11). It is envisaged that this will feed into the Queensland Water Commission groundwater monitoring program to ensure that adaptive management will be achieved rather than reactive management.

The Coordinator-General emphasises that the cumulative volume of CSG water extracted in the Surat Basin could be very large (possibly as much as 5000 gigalitres over the life of the gas field development) and that monitoring of groundwater levels and other changes where they occur will be an essential part of the long-term land use strategies for the region.

7.6. Workers accommodation—CSG fields

7.6.1. Introduction

The proponent has current operating interests in several CSG fields in central Queensland, including the:

- Spring Gully and Fairview fields in the Bowen Basin
- Talinga field in the Surat Basin.

It is proposed that a staged development for the extraction of gas over 30 years be undertaken. Due to the timeframes involved, details of the earlier stages of development for CSG extraction are more definitive. For the latter stages, the details will be refined closer to the time of development.

Over the first five years of the project, the proponent plans to develop several temporary worker accommodation facilities (TWAFs) at:

- Talinga, for 450 people (existing site)
- Condabri North, for 500 people
- Reedy Creek, for 500 people
- Condabri Central, for 300 people
- Combabula, for 360 people.

There will also be a highly mobile accommodation facility for each drilling rig, which accommodates 10-15 people.



All these accommodation facilities will be located within petroleum leases and on land owned by the proponent.

The TWAFs will include individual units, mess halls, recreational facilities, utilities, car parking, sewage treatment plants, administration rooms, and waste management areas.

The proponent has indicated that it will develop a Housing and Accommodation Strategy which will include actions designed to mitigate against negative impacts the influx of workers required for the CSG fields component of the project will have on the relevant local housing and rental market. The Strategy is discussed further in section 6.2 of this report.

7.6.2. Workforce and necessary accommodation

Table 7.11 summarises the workforce numbers needed during the construction and operational phases of the CSG fields and how those workers will be accommodated.

Table 7.11—Summary of Workforce Numbers—CSG Fields

Workforce type	Peak numbers	Timing	Accommodation
Construction	2,100	2012-2017	TWAFs in Talinga, Condabri, North, Reedy Creek, Condabri Central and Combabula.
Operational (at logistics hubs)	67 in Brisbane 67 in Miles 67 in Roma	2020-2027	Housing stock of Brisbane, Miles and Roma.
Operational (in CSG fields)	700	2011-2027	130—TWAFs in Condabri 230—TWAFs in Reedy Creek 340—housing stock of surrounding towns

7.6.3. Issues pertaining to worker accommodation raised by stakeholders

There have been several issues raised by stakeholders that pertain to CSG field worker accommodation, including that:

- the accommodation should incorporate energy efficient design, be of a high building quality, be built to ensure visual and acoustic privacy for workers and incorporate disability access to meet Australian standards
- the TWAFs should be constructed in a manner that complies with the Queensland Development Code (MP3.3)
- the proponent must ensure that drinking water for workers living at the TWAFs is potable;
- the proponent must ensure that waste from the TWAFs is disposed of appropriately and in accordance with the relevant requirements
- prior to construction of the TWAFs, the proponent consult with the relevant local government and provide:
 - location, nature and extent of facility, and employee numbers
 - layout plans of facilities
 - traffic route plans
 - construction, completion and decommissioning dates; site service proposals
 - compensation arrangements for impacts infrastructure
- first aid facilities are available at the TWAFs and that the proponent facilitate orientation visits for relevant emergency services staff
- the proponent should locally source materials to construct the TWAFs and supplies for the workers.
- the sum of workers needed for the construction phase of this and other similar projects in the region is substantial and equates to a significant increase in the population (if only temporarily) for the region
- those operational workers living and undertaking activities in the logistics hubs of Brisbane, Miles and Roma are in numbers small enough (comparative to the established populations) to not have a noticeable impact on housing affordability in those places.



7.6.4. Coordinator-General's conclusions

Issues raised by stakeholders about worker accommodation required for both the construction and operational phases of the CSG field component of this project have been noted. Specific conditions relating to gas field worker accommodation are set out in Appendix 2, Part 1.



8. Pipeline

8.1. Overview

The high pressure gas transmission pipeline network conveys dehydrated and compressed CSG from the Walloons gas fields approximately 450 km to the LNG facility on Curtis Island.

The main trunk line comprises a 1070 mm buried steel line extending 362 km from a hub south-east of Wandoan to the LNG facility on Curtis Island (refer to Figure 8.1). A 760 mm lateral extending 38 km connects the Woleebee and western gas development areas with the hub and a 760 mm lateral extending 44 km connects the Condabri and southern development gas areas with the hub. A high pressure gas pipe network connects each of the Gas Processing Facilities (GPF) to the main transmission line via the laterals.

Above ground ancillary facilities will also be incorporated including isolation valves, scraper launchers and receivers and instrumentation for control and monitoring. These facilities will be enclosed within secure fencing.

The preferred route was selected based on engineering considerations and with the aim of minimising environmental, land use and cultural heritage impacts. Existing easements were used as far as practicable and the route selected to avoid impacts wherever possible. It is expected the pipeline may be co-located with other CSG pipelines for more than half its length. This includes the section gazetted by the Queensland Government within the Callide Infrastructure Corridor State Development Area (CICSDA) and the Gladstone State Development Area (GSDA).

The transmission pipeline network has been designed to meet the 18 Mtpa ultimate capacity of the LNG plant and is to comply with applicable Australian and industry standards including AS2885 and the Australian Pipeline Industry Association's Code of Environmental Practice.

Construction is scheduled to take approximately 18 months commencing in 2012 with handover scheduled for early 2014 following hydro-testing and commissioning. The direction of construction is expected to take place from South to North i.e. Miles to Gladstone.

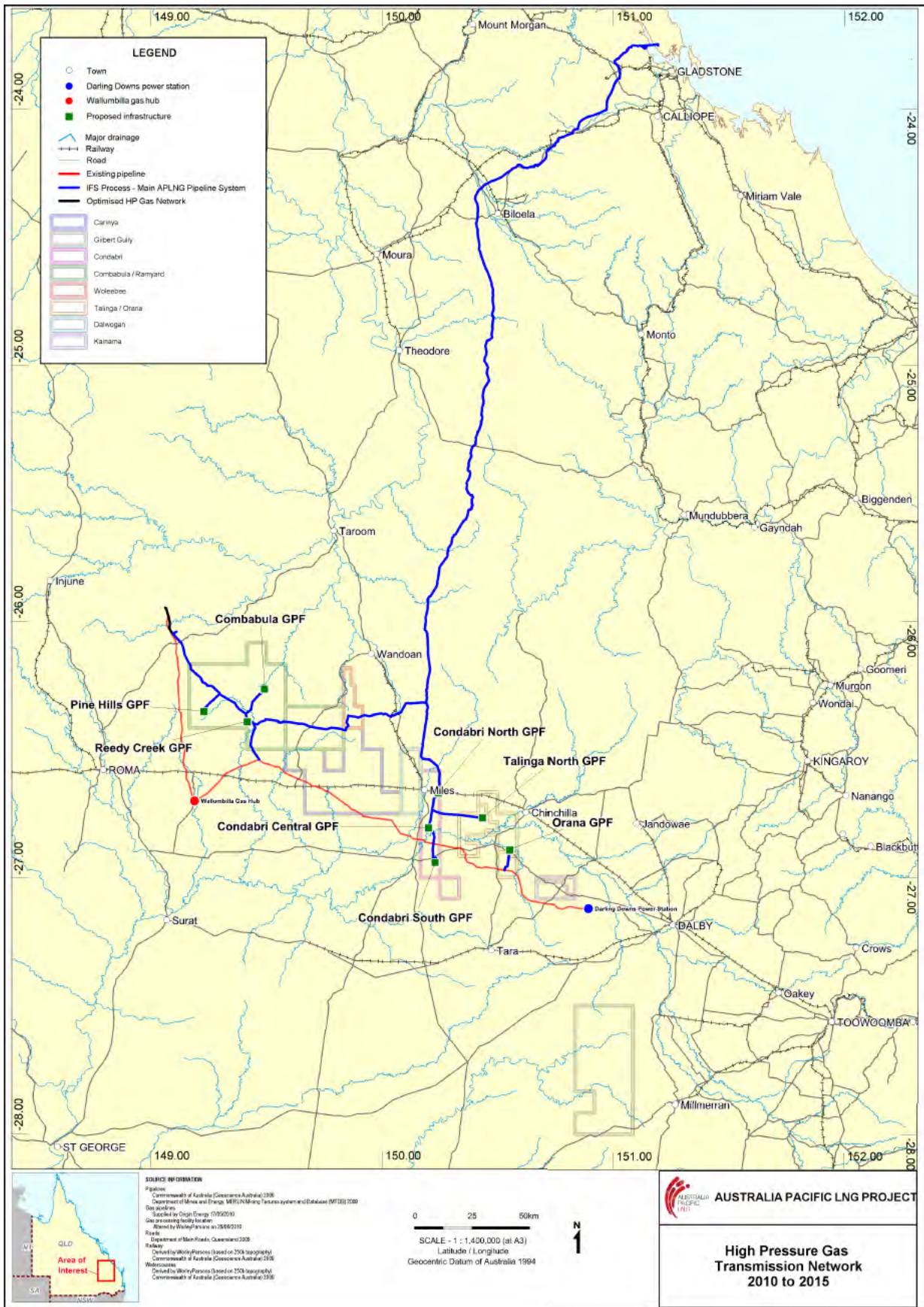
As gas field wells and infrastructure progressively come on line from 2012, commencing with the Condabri gas field, produced CSG will initially be fed to the State's existing gas network infrastructure and consumed domestically prior to the main transmission gas line being completed. The Darling Downs Power Station and pipeline will be utilised in large part during this 'ramp up' period.

Construction of the main transmission line, laterals and associated network will involve the establishment of a number of temporary accommodation facilities (TWAfs) to house the construction workforce. Up to seven TWAfs are anticipated at locations along the pipeline routes. This aspect is dealt with further in section 8.3.

Also required will be laydown areas to temporarily store the 18 metre pipeline segments at locations along the pipeline route prior to construction. Pipes are railed from Gladstone to Biloela and distributed to the laydown areas by road transport (discussed further in section 6.1). From the laydown areas, pipes will be distributed to the 40 metre wide Right of Way (ROW) by road. Up to five laydown areas are anticipated—the bulk of which are anticipated to be located on the pipeline licence tenement.



Figure 8.1—Gas Transmission Pipeline Network





8.2. Environmental

8.2.1. Terrestrial flora

This section of the report provides an evaluation of the potential impacts of the project on terrestrial flora of state significance. Matters of national environmental significance are addressed in chapter 10 of this report. Volume 3, Chapter 8 and Volume 5, Attachment 15 of the EIS addressed terrestrial ecology for the pipeline. Further information was provided within the supplementary information.

The study area used for the desktop studies in the EIS was a 5 km corridor either side of the proposed pipeline alignment. The study area used for the field surveys in the EIS was a 100m wide corridor. The Right of Way (ROW) is proposed to be 40m.

Flora species

A total of 89 threatened species of conservation significance (national and/or state significance) were recorded within the pipeline study area through desktop studies. Of the 89 threatened flora species, 10 were listed under the EPBC Act, 56 were listed under the NC Act, and 23 were listed under both. The EIS states that there is potential for all of the 89 threatened species identified in the study area to potentially occur in the pipeline ROW.

In addition to the threatened species identified, 49 regionally significant species were recorded within the pipeline study area through desktop studies.

Four threatened species were observed within or in the vicinity of the pipeline ROW during the EIS field surveys. These included:

- *Acacia pedleyi*
- *Cadellia pentastylis*
- *Cycas megacarpa*
- *Macropteranthes leiocaulis*.

The EIS⁶⁰ stated that the highest impact will be on threatened flora species that have restricted distributions and spatial extents. This most likely will occur in the Callide Range and the Calliope Range pipeline sections where alternate route options are limited, for the threatened species *Cycas megacarpa* and *Acacia pedleyi*. The proposed pipeline has the potential to significantly impact both of these threatened flora species.

Nine regionally significant species were observed within or in the vicinity of the pipeline ROW during the EIS field surveys. These included:

- *Acacia aprepta*
- *Acacia shirleyi*
- *Corymbia bloxsomei*
- *Dodonaea biloba*
- *Dodonaea macrossanii*
- *Eucalyptus bakeri*
- *Eucalyptus camaldulensis*
- *Homoranthus melanostictus*
- *Callistemon viminalis*.

The EIS claims that clearing associated with the pipeline ROW will have minimal impact on regionally significant flora species.

In addition to threatened and regionally significant species, other species of conservation significance identified in the EIS included flora species relating to cultural significance, commercial significance, recreational significance and weeds.

⁶⁰ EIS: Volume 3 Chapter 8, Section 8.4.5



Although the EIS identified several plant species of cultural significance within the proposed pipeline ROW, there is no assessment of the potential impact on these species.

The EIS states that the ROW alignment will intersect known commercial timber resources at the Callide Timber Reserve and the Targinie State Forest. The clearance is predicted to be 0.2 per cent of each of the Callide and Targinie resources. Therefore the impact on the economic value of the proposed pipeline is not considered significant.

Areas containing plants for which hold value for recreational activities such as fishing, boating, birdwatching and bushwalking are identified in the EIS for the proposed pipeline ROW. There is no assessment of the impact of this proposed vegetation clearance.

During EIS field surveys, 21 non-native flora species were identified along the proposed pipeline alignment. This included:

- three Weeds of National Significance (WONS) under the Australian Weed Strategy;
- three Class 2 Declared Weeds under the *Queensland Pest and Stock Route Management Act 2002*
- two Class 3 Declared Weeds under the *Queensland Pest and Stock Route Management Act 2002*.

The EIS⁶¹ stated that potential for the spread of weeds is high. The proponents propose conducting further surveys in areas where declared weeds are likely to occur.

Terrestrial communities

The EIS states that the pipeline ROW comprises a total area of 1,759ha. Of the total, 75.4 per cent (1326ha) is considered non-remnant vegetation and 24.6 per cent (433ha) is considered remnant vegetation.

Table 8.1—Extent of remnant vegetation within the pipeline ROW, based on regional ecosystem status

Remnant vegetation—Regional ecosystem status	Area (ha)	% of gas pipeline footprint
Endangered (VMA)	2.6	0.1
Of Concern (VMA)	13.4	0.8
Least Concern (VMA)	417	23.7
Total	432.9	

The VMA provides the conservation status for Regional Ecosystems (REs) in Queensland. REs that are considered threatened are those that are listed under the VMA as 'endangered' or 'of concern'.

The EIS estimates that approximately 433ha of remnant vegetation occurs within the pipeline ROW, consisting of 43 different REs. Of this, 5 'endangered' REs (EREs) and 6 'of concern' REs are located within the ROW. Table 8.2 provides a summary of the threatened species likely to be disturbed by the proposed pipeline.

Table 8.2—Regional ecosystems located within the proposed pipeline ROW

Regional ecosystem	Description	VMA Status	EPBC Status	Extent within pipeline ROW (ha)
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristate</i> open forest on fine-grained sedimentary rock	Endangered	Endangered	1.7
11.11.18	Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding.	Endangered	Endangered	0.1
11.12.21	<i>Acacia harpophylla</i> open forest on igneous rocks. Colluvial lower slopes.	Endangered	Endangered	0.1

⁶¹ EIS Volume 3, Chapter 8 Section 8.4.7



Regional ecosystem	Description	VMA Status	EPBC Status	Extent within pipeline ROW (ha)
12.3.3	<i>Eucalyptus tereticornis</i> woodland to open forest on alluvial plains.	Endangered	Endangered	0.7
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains.	Of concern	Endangered*	0.4
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. Tall woodland on alluvial plains.	Of concern	-	6.7
11.9.7	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks.	Of concern	-	5.1
11.9.10	<i>Acacia harpophylla</i> , <i>Eucalyptus populnea</i> open forest on fine-grained sedimentary rocks.	Of concern	-	0.3
11.11.10	<i>Eucalyptus melanophloia</i> woodland on deformed and metamorphosed sediments and interbedded volcanics.	Of concern	-	0.4
12.3.11	<i>Eucalyptus tereticornis</i> , <i>E. siderophloia</i> , <i>Corymbia intermedia</i> open forest on alluvial plains near coast.	Of concern	-	0.2
12.11.14	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> woodland on metamorphics +/- interbedded volcanics.	Of concern	-	0.5
Total area of threatened REs within APLNG Pipeline ROW				16.2

* Only where weeping myall *Acacia pendula* occurs.

A total of 16.2ha of 'endangered' and 'of concern' REs are predicted to be disturbed by the proposed pipeline ROW. This equates to less than 1 per cent of the total ROW area.

The EIS recognises that two nationally important wetland areas, Port Curtis and The Narrows, and an area of state and local government wetlands at Gladstone/Port Curtis are transected by the pipeline ROW. Construction of the proposed pipeline is estimated to require clearing 11.7ha of coastal wetland vegetation in the Port Curtis area.

Potential impacts on terrestrial communities from the proposed pipeline are described in the EIS and include:

- vegetation fragmentation and an associated increase in edge effects
- modification of microclimates and associated impacts on sensitive terrestrial communities
- modification of floristic structure and composition including an increase in introduced and pioneer species
- modification of fire regimes
- long-term modification of hydrological regimes resulting in changes in floristic composition and loss of biodiversity from terrestrial communities. Marine communities in the wetland areas of Port Curtis and The Narrows may be susceptible to this impact if tidal flows are impacted
- increased air pollution and dust nuisance during construction activities.

Mitigation and management—terrestrial flora

The EIS proposes mitigation and management of impacts on terrestrial flora species along and within the vicinity of the proposed pipeline ROW through the following actions:

- limit vegetation clearing to the minimum possible extent and utilise existing tracks and cleared areas
- develop and implement a vegetation management/monitoring plan prior to construction



- develop and implement a weed and pest biosecurity management plan during construction and operation
- incorporate rehabilitation measures into environmental management plans
- develop a program of vegetation offsets for unavoidable impacts
- Develop a vegetation offsets policy

The EIS assesses the residual risks associated with the proposed pipeline on terrestrial ecology as ranging from low to medium.

Coordinator-General's conclusion—terrestrial flora

The final vegetation clearing requirements for the pipeline will be ascertained during final design. However, the estimated impacts involving the loss of 433ha of remnant vegetation comprising 16.2ha of 'endangered' or 'of concern' REs over a pipeline length of 450 km is considered relatively small.

As outlined in Volume 1 Chapter 6 (section 6.2.6) of the EIS, APLNG have proposed a number of commitments, mitigation strategies and actions and incorporated these into draft EM Plans to minimise, manage and offset impacts in relation to terrestrial ecology for the proposed pipeline.

Conditions for the environmental authority for managing terrestrial flora impacts on the advice of DERM, are stated at Schedule F, Appendix 3, Part 4.

To provide offsets for any unavoidable disturbance of state significant terrestrial flora, APLNG is required to develop an offsets program that is approved by DERM and DSEWPC prior to approval and commencement of any pipeline works.

8.2.2. Terrestrial fauna

This section of the report provides an evaluation of the potential impacts of the project on terrestrial fauna of state significance. Matters of national environmental significance are addressed in section 10 of this report. Volume 3, Chapter 8 of the EIS addressed terrestrial ecology for the pipeline. Further information was provided within the supplementary information.

Terrestrial fauna species are afforded protection by the *Nature Conservation Act 1994* (NC Act) and the conservation status of fauna in Queensland is listed in the *Nature Conservation (Wildlife) Regulation 2006*.

As a result of desktop studies, a total of 711 terrestrial fauna species were recorded within the study area. Of the 711 species, 28 were invertebrates, 46 fish, 43 amphibians, 137 reptiles, 362 birds and 95 mammals. In addition to desktop studies, a field assessment was undertaken. Field assessments resulted in a total of 182 species being recorded. Of the 182 species, 5 were amphibians, 19 reptiles, 124 birds and 24 mammals.

A total of 66 threatened fauna species of conservation significance (national and/or state significance) were recorded within the pipeline study area through desktop studies. These comprised of two invertebrates, one fish, four amphibians, 16 reptiles, 31 birds and 12 mammals. Of the 66 threatened fauna species, 5 were listed under the EPBC Act, 39 were listed under the NC Act, and 22 were listed under both. Field studies confirmed the presence of five of the threatened fauna species in the pipeline ROW. In addition to threatened species, four species that are not listed under the relevant legislation however are ranked as 'high priority' under the Back on Track species prioritisation framework have been included in the EIS as threatened species. The EIS states that 48 of the 66 threatened species are considered to potentially utilise habitats along the pipeline ROW. Of these 48 fauna species, the EIS⁶² stated that 31 species have the potential to be impacted to some extent by the gas pipeline, due to effects on habitat or direct impacts.

⁶² EIS: Volume 3, Chapter 8, Section 8.4.14



In addition to threatened fauna species, the EIS identified through desktop studies an additional 95 species of regional significance. These comprised of seven fish, 12 amphibians, 15 reptiles, 29 birds and 32 mammals. Of the 95 regionally significant fauna species, 57 are listed as non-threatened priority taxa within the South East Queensland bioregion, 18 are listed as priority taxa within the Brigalow Belt South bioregion, and 20 are listed as priority taxa within both bioregions or are listed in the relevant action plan. The EIS states that 86 of the 96 regionally significant species are considered to potentially utilise habitats within the pipeline ROW.

In addition to threatened and regional significant fauna species, an additional 38 migratory bird species were identified in the EIS as recorded in the wider study area. Although not threatened fauna species, these are Matters of National Environmental Significance (MNES) therefore are addressed in Chapter 10 of this report.

The EIS identified 21 introduced fauna species within the pipeline study area including three fish, one amphibian, seven birds and 10 mammals. Field inspections indicated eight introduced fauna species present within the pipeline ROW.

The EIS acknowledges that impacts on fauna habitats will occur as a result of the proposed pipeline. Impacts include:

- removal of habitat including hollow-bearing trees
- disturbance of rocky outcrops including cave habitats
- disturbance to fauna movement corridors and dry season fauna refuges
- potentially unearthing burrowing fauna during construction, and
- trenchfall.

The EIS estimates the total faunal habitat to be cleared as a result of the proposed pipeline is 563ha. Impacts on common fauna are considered to be unlikely to result in a significant long-term impact due to similar habitats available in adjacent areas.

The EIS states that 18 of the threatened fauna species are susceptible to trenchfall.

Mitigation and management—terrestrial fauna

The EIS proposes mitigation and management of impacts on terrestrial fauna species along and within the vicinity of the proposed pipeline ROW through the following actions:

- minimise the clearance footprint, avoiding removal of mature vegetation
- trim branches where possible rather than removing the tree
- retain hollow bearing trees wherever practicable
- undertake a pre-clearance inspection to identify potential nesting or roosting sites. If present, construction will be timed to avoid nesting and reproduction seasons, where reasonably practicable
- minimise the clearance width through sections of remnant Brigalow/Belah. Respread cleared timber over the easement
- cross watercourses and fringing riparian woodland or floodplain woodland at right angles and during the dry season where practicable
- minimise the time trenches are open and locate ramps and trench plugs at least every 500m.
- undertake daily fauna surveys of open trenches
- limit vehicle movement to designated areas and within speed limits
- respread logs, hollows and timbers across disturbed areas and allow natural regeneration of native shrubs
- protect and retain natural drainage patterns
- Incorporate rehabilitation measures into environmental management plans
- develop a vegetation offsets policy.

The EIS assesses the residual risks associated with the proposed pipeline on terrestrial ecology as ranging from low to medium.



Coordinator-General's conclusion—terrestrial fauna

As outlined in the EIS⁶³ APLNG have made a number of commitments in relation to avoiding, minimising and managing impacts to terrestrial ecology and incorporated these into the draft EM Plans.

Conditions for the environmental authority for managing terrestrial fauna impacts on the advice of DERM are stated at Schedule F, Appendix 3, Part 4.

A Rehabilitation Permit (Spotter Catcher) is required under the NC Act for individuals who catch fauna along the pipeline route during construction. The rehabilitation permit would include conditions, other than those stated above, to ensure the appropriate handling of fauna.

To provide offsets for any unavoidable disturbance of state significant terrestrial fauna, APLNG is required to develop an offsets program that is approved by DERM and DSEWPC prior to approval and commencement of any pipeline works.

8.2.3. Marine habitats

This section of the report provides an evaluation of the potential impacts of the project on marine habitats of state significance. Matters of national environmental significance are addressed in section 10 of this report. The EIS⁶⁴ addressed marine ecology for the pipeline.

The legislative framework surrounding marine ecology consists of both State and Commonwealth legislation. The relevant Commonwealth legislation and matters of national environmental significance are addressed in section 10 of this report. The relevant State legislation applied to the marine ecology of the proposed pipeline includes:

- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- *EP Act*
- *Coastal Protection and Management Act 1995.*

The study area used for the EIS desktop studies and field surveys in the EIS was the wetlands of Targinie Creek on the mainland, The Narrows, and the landing on Curtis Island. Port Curtis falls within the Shoalwater Coast bioregion. According to the State Coastal Plan, the wetlands that will be disturbed by the proposed pipeline are considered 'areas of state significance (natural resources)'. The proposed pipeline requires disturbance of intertidal areas in the Friend Point and Curtis Island areas. EIS studies demonstrated that these intertidal areas include mudflats, sandy beach, isolated mangrove trees, and saltpan/saltmarsh. In addition to intertidal areas, subtidal areas will also be disturbed by the proposed pipeline. EIS studies demonstrated that the seabed in the subtidal areas predominately consists of bare sediment and significant amounts of shell material. The subtidal area within the proposed pipeline route does not include seagrass or reef habitat.

The disturbance footprint of the proposed pipeline is approximately 3km long and 25m wide (7.5ha). The pipeline will be buried in the subtidal areas, limiting impacts in that area to the construction period. Disturbance of the intertidal area of saltpan/saltmarsh as a result of the proposed pipeline is 0.16 per cent of the total saltpan/saltmarsh habitat within Port Curtis.

The disturbance footprint of the proposed pipeline is approximately 3km long and 25m wide (7.5ha). The pipeline will be buried in the subtidal areas, limiting impacts in that area to the construction period. Disturbance of the intertidal area of saltpan/saltmarsh as a result of the proposed pipeline is 0.16 per cent of the total saltpan/saltmarsh habitat within Port Curtis.

During construction, habitat fragmentation and changes to tidal flows will occur. This can have consequent impacts on saltmarsh flora and mangroves and may result in isolated dieback. If Horizontal Directional Drilling (HDD) is the option chosen for the pipeline crossing, approximately 0.008 per cent of the total saltpan/saltmarsh habitat within Port Curtis will be required to be cleared and graded. In addition, access tracks will be required to be cleared. The EIS does not estimate the area of clearance required for these.

Whether HDD or dredging is chosen as the construction method, wetlands, including saltpan/saltmarsh and mangroves will be disturbed by the proposed pipeline. Management of impacts will need to focus on ensuring alterations to tidal flows is limited so as to not result in wider impacts to marine ecology.

⁶³ EIS: Volume 1, Chapter 6, Section 6.2.6 of the EIS and Volume 3, Chapter 8, Table 8.15

⁶⁴ EIS: Volume 3, Chapter 10 and Volume 5, Attachment 19



Mitigation and management—marine habitats

The EIS proposes mitigation and management of impacts on marine habitats along and within the vicinity of the proposed pipeline through the following actions:

- develop a construction methodology that will minimise disturbance
- work with State government, Gladstone Ports Corporation and other proponents to achieve an outcome that minimises cumulative impacts
- if dredging is the adopted construction method, all activities will be undertaken in accordance with dredge management procedures.

The EIS assesses the residual risks associated with the proposed pipeline on marine ecology as low.

Coordinator-General's conclusion—marine habitats

The EIS⁶⁵ outlined a number of proposed commitments, mitigation strategies and actions and incorporated these into draft EM Plans to minimise, manage and offset impacts in relation to marine ecology for the proposed pipeline. To ensure these commitments are implemented, conditions have been set for the environmental authority for managing marine habitat impacts on the advice of DERM, at Schedule F, Appendix 3, Part 4.

To provide offsets for any unavoidable disturbance of state significant marine habitats, APLNG is required to develop an offsets policy that is approved by DERM and DSEWPC prior to approval and commencement of any pipeline works.

8.2.4. Marine fauna

This section of the report provides an evaluation of the potential impacts of the project on marine fauna of state significance. Matters of national environmental significance are addressed in section 10 of this report. Volume 3, Chapter 10 and Volume 5, Attachment 19 of the EIS addressed marine ecology for the pipeline.

The legislative framework surrounding marine ecology consists of both State and Commonwealth legislation. The relevant Commonwealth legislation and matters of national environmental significance are addressed in chapter 10 of this report. The relevant State legislation applied to the marine ecology of the proposed pipeline includes:

- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- *Nature Conservation Act 1992*
- EP Act
- *Coastal Protection and Management Act 1995.*

The Port Curtis region within which the pipeline is proposed, includes extensive wetland habitats which support species of state conservation significance. The EIS identifies a number of marine species of state conservation significance which may exist within the proposed pipeline region. These include:

- dugong—listed as 'vulnerable to extinction' under the NC Act and 'vulnerable' under the International Union for the Conservation of Nature (IUCN)
- marine turtles—species listed as 'vulnerable' or 'endangered' under the NC Act
- cetaceans (whales and dolphins)
- sea snakes
- pipefish and seahorses
- macrobenthic infauna
- plankton
- fish and nekobenthic invertebrates.

The area adjacent to the proposed pipeline site is declared a 'Dugong Protection Area B' under the NC Act. 'Dugong Protection Area B' is the second most important area under the legislation and represents less significant but still important habitat.

⁶⁵ EIS: Volume 1, Chapter 6, Section 6.2.8



The EIS identifies Flatback turtles, Green turtles and Loggerhead turtles as likely to nest in the vicinity of the proposed pipeline area. These are listed as 'vulnerable' and 'endangered' under the NC Act.

The EIS identifies the Indo-Pacific humpback dolphin, the Australian snubfin dolphin and the Bottlenose dolphin as species known to occur adjacent to the proposed pipeline site.

The EIS suggests that it is likely that the elegant seasnake, the spine-bellied seasnake, and the small headed seasnake are likely to occur in the vicinity of the proposed pipeline.

The EIS identifies the estuary stingray as likely to occur frequently within the vicinity of the proposed pipeline. This species of stingray is ranked as a 'high priority' species by DERM's Back on Track framework.

The EIS identifies the area to include habitats for various species of fish, crab and prawns. The EIS states that the nearest declared fish habitat areas to the proposed pipeline location are:

- Fitzroy River—approximately 23km from the proposed site
- Colosseum inlet—approximately 35km from the proposed site
- Rodds Harbour—approximately 50 km from the proposed site.

Impacts from the pipeline on marine fauna are limited to the construction period. Pipeline construction activities may have the following impacts of marine fauna:

- disturbance of subtidal seabed habitats
- creation of a turbid plume from dredging
- contamination through spills (of drilling fluid such as bentonite)
- underwater noise from dredging.

Dredging will result in direct disturbance to subtidal habitat and removal of animals contained within the sediment. EIS field studies identified that the proposed pipeline dredge footprint does not contain seagrass or structure-forming organisms. The EIS has assessed the overall risk to the benthic assemblage from dredging as low. Other than attempting to minimise the dredge footprint, the EIS does not identify or propose any additional mitigation measures to reduce impacts.

Turbidity plumes as a result of dredging activities are considered by the EIS to have a low overall risk to benthic assemblages and seagrass beds.

Underwater noise generated during pipeline dredging activities and HDD is considered by the EIS to have a low overall risk to dugong and cetaceans. Impacts will be limited to the construction period.

Impacts of potential bentonite spillage during HDD activities are considered by the EIS to have a low overall risk to the marine environment.

Mitigation and management—marine fauna

The EIS proposes mitigation and management of impacts on marine fauna along and within the vicinity of the proposed pipeline through the following actions:

- develop a construction methodology that will minimise disturbance
- work with State government, Gladstone Ports Corporation and other proponents to achieve an outcome that minimises cumulative impacts
- establish a process for visual observations and recording of dugongs and cetaceans
- if dredging is the adopted construction method, all activities will be undertaken in accordance with dredge management procedures
- where practicable, APLNG will deploy silt curtains during dredging
- dredging will only occur during safe weather conditions as defined by the Harbour Master
- no deliberate discharge of bentonite to the environment will occur and all waste will be disposed of offsite. In the event of a spill, all activities will cease and corrective action taken immediately

The EIS assesses the residual risks associated with the proposed pipeline on marine ecology as low.



Coordinator-General’s conclusion—marine fauna

The EIS⁶⁶ outlined APLNG commitments, mitigation strategies and actions and incorporated these into draft EM Plans to minimise, manage and offset impacts in relation to marine ecology for the proposed pipeline. To ensure these commitments are implemented, conditions for the environmental authority for managing marine fauna impacts on the advice of DERM are set at Schedule F, Appendix 3, Part 4.

To provide offsets for any unavoidable disturbance of state significant marine fauna, APLNG is required to develop an offsets policy that is approved by DERM and DSEWPC prior to approval and commencement of any pipeline works.

8.2.5. Amenity and safety

Air emissions

The major sources of air emissions will come during construction and include:

- trucks and machinery accessing the pipeline corridor
- clearing and grading the gas pipeline right-of-way
- vehicle movements associated with stringing the pipeline
- rock blasting
- sourcing and placing bedding and padding material for the pipeline
- backfilling
- clean-up and site rehabilitation.

Most of these activities will be within the pipeline corridor and at some distance from receptors. It is noted that the proponent intends using the ROW within the pipeline corridor as much as feasible to avoid traffic impacts on local roads.

Dust suppression will generally be achieved by watering unsealed tracks and roads and by wash-down of vehicles before they leave work sites. The water used for dust suppression is likely to be sourced from treated CSG water. CSG water is a regulated substance and its release to the open environment must be in accordance with an EA approved by DERM.

The EIS lists undertakings made by the proponent to manage the potential impacts of air emissions associated with construction of the gas pipeline. These include:

- minimising the area and duration of land disturbance activities as far and possible
- scheduling land disturbance activities with recognition of potentially adverse weather conditions
- reducing speed limits on unpaved roads and tracks adjacent to sensitive receptors
- suppressing dust, where required with water or other suitable means
- rehabilitating disturbed areas as soon as practicable.

These mitigation and management commitments are listed in Appendix 6.

Conditions for the environmental authority, on the advice of DERM, are set at Schedule B, Appendix 3, Part 4, covering air borne emissions.

Noise and vibrations

The impact of noise on amenity values will be limited by separation of the activity areas from noise receptors (occupied dwellings in the vicinity of the activities). Operationally, there will be some noise at the pipe laydown sites, associated with unloading pipes from the railway and re-loading lengths of pipe for an average of 40 transport movements per day delivering pipes to the pipeline construction sites. This noise will mainly be associated with vehicular movements.

Potentially there could be significant but infrequent noise and vibration generation from civil engineering works along the pipeline route. The potential for encountering rock and requiring blasting and impact drilling can be minimised by careful route selection, although ecological and social constraints may limit the proponent’s capacity to avoid hard rock areas.

⁶⁶ EIS: Volume 1, Chapter 6, Section 6.2.8



Ambient noise levels along the pipeline route are relatively quiet (particularly at night) except near communities and towns, near major transport corridors (rail and road), and on a temporal/seasonal basis where rural activities like cropping demand high levels of activities for relatively short periods during harvesting.

The EIS⁶⁷ stated that the noise and vibration impacts were assessed by applying relevant regulations, guidelines and policies for the non-marine environment during the pipeline construction and conducting baseline underwater noise level surveys at representative locations in the Gladstone Harbour.

Existing provisions of the EP Act specify that any building activity that creates an audible noise may only occur between the hours of 6.30 am to 6.30 pm (except Sundays and public holidays). Noise limits for activities undertaken outside these hours is regulated under an environmental authority.

The EP Act specifies acceptable levels for ground vibration and air blast overpressure that would apply to any required blasting necessary for construction of the gas field infrastructure.

Vibration criteria for human comfort are not applicable for the construction of the pipeline as the activities involved in trenching, laying the pipes and restoring the sites are transient. However, a minimum separation distance of 100 metres from an activity and the nearest sensitive receptor (an occupied house), commercial premises or heritage listed structure has been adopted by the proponent.

DERM has prepared a noise control guideline prescribing methods and procedures for setting EA noise and vibration conditions. Specifically the guideline is intended to address the issue of “noise creep” that arises from iterative increases in background noise, containment of variable noise and short term events to an “acceptable level” and setting noise limits to transient noise event to avoid sleep disturbance.

The EIS has stated that the proponent has committed to implement safeguards to avoid or minimise the degree of disturbance during construction and operation of the pipeline. These mitigation and management measures are included at Appendix 6. The Coordinator-General is satisfied that these measures will adequately deal with noise issues. Conditions for the environmental authority, on the advice of DERM, are set at Appendix 3, Part 4, Schedule B covering the prevention of nuisance from noise and vibration.

Landscape and visual amenity

The impact from construction activities could vary greatly, from negligible in areas of low geographic relief, to significant in areas of elevated areas and where new land clearing must be undertaken. The EIS stated that adverse impacts can be minimised and when rehabilitation has been fully effective the residual risk level to visual amenity was low to negligible⁶⁸.

The essential mitigation practices include avoiding areas with high visual prominence and selecting work and campsites that are shielded from residences, highways and towns, as far as practicable. Restoring activity sites may take several years, however natural processes of vegetation regrowth can be enhanced if care being taken in the initial procedures for site recovery and appropriate revegetation techniques are adopted.

Other safeguards proposed include:

- minimising construction time within visible areas of the sensitive receptors
- minimising clearing of forest and woodland cover, particularly in the vicinity of sensitive receptors
- undertake detailed analysis of the visual catchment of each temporary accommodation facility to establish if there are any sensitive receptors within 800 metres of the facility. Where required, implement strategies to minimise impacts, in consultation with the landholder
- where sight lines are important in forested areas, re-establish cover (within operational and safety bounds) to diminish the contrast between the adjoining vegetation and the easement.

The EIS has stated that the safeguards will be adopted to avoid or minimise the degree of disturbance in the gas field. These mitigation and management measures have been included in this report at Appendix 6.

⁶⁷ EIS: Volume 3, Chapter 15, Section 15.1.2

⁶⁸ EIS: Volume 3, Chapter 7, Section 7.6



Hazard, risk, health and safety

The EIS discussed the recognised hazards and risks for construction and operation of the pipeline, summarising these as:

- CSG is a hazardous substance containing about 97 per cent methane.
- the pipeline may be purged with nitrogen before commencing pipeline use and when decommissioning. Nitrogen asphyxiation has caused fatalities in Australia and elsewhere when appropriate procedures have not been followed
- potential accidents, spillages and abnormal events associated with construction, operation and decommissioning
- cumulative risk levels, having regard to activities on adjacent land
- natural hazards including bushfire, flooding, dangerous wildlife and disease.

The highest level of risks associated with the construction of the pipeline relate to transportation accidents. The EIS stated that proposed safeguards and controls would mitigate but not overcome the residual risks.

The EIS has provided commitments to provide safeguards that will be adopted to avoid or minimise the degree of disturbance in the gas field. These mitigation and management measures have been included in this report at Appendix 6.

8.2.6. Agency advice

DERM has advised that further information is required in the following areas and that such information could be provided in the EM Plan to accompany the proponent's application for an environmental authority:

- arrangements for managing environmental nuisance (including noise, vibration and blasting)
- water management
- waste management
- sewage treatment and disposal
- minimising disturbance to land and soil management
- erosion and sedimentation control
- disturbance to land uses including stock routes, cropping, GQAL, fencing and stock management
- impact on environmentally sensitive areas, endangered ecosystems and other regionally important ecosystems, fauna management, state forests and timber
- site rehabilitation
- pest and weed control
- storage and handling of chemicals, flammable and combustible liquids and incident notification procedures
- monitoring programs
- managing community issues and complaints
- hydrostatic test water impact management.

DEEDI has identified issues in the following areas and has sought specific conditions to address these:

- the spread of pest plants and other declared weeds that are believed to be present in the local government areas through which the gas transmission pipelines are to be located
- security of the pest animal barrier fences (wild dog and rabbit)
- environmental damage at waterway crossings.

8.2.7. Coordinator-General's conclusion

The proponent has prepared draft EM Plans covering construction and operation of the gas transmission pipeline, which are overviewed in section 5 of this report. The draft EM Plans incorporate environmental protection commitments made by the proponent in the EIS which are listed here in Appendix 6. It is accepted that these commitments and the draft EM plans provide a basis for managing construction and operating the pipeline, but that further work needs to be done to bring them into a form acceptable to DERM for compliance with the EP Act.



Accordingly, conditions 1 and 2 are imposed (Appendix 3, Part 3) specifying the matters that should be addressed in the EM Plan that accompanies an application for environmental authority for the gas transmission pipeline.

Conditions are also set, on advice from DERM, that should apply for the environmental authority (pipeline licence). These are listed in Appendix 3, Part 4.

Other sections of this report discuss 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, it is noted 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 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 it is envisaged 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.

Conditions are also imposed on APLNG (Condition 9, Appendix 3, Part 2), stock routes (Condition 6, Appendix 1, Part 1), impacts on native flora and fauna and species management (Condition 7, Appendix 1, Part 1) that are to address issues raised by DERM.

8.3. Workers accommodation—gas pipeline

8.3.1. Introduction

A high pressure underground pipeline will be developed to transport the coal seam gas from the gas fields in the Surat and Bowen Basins to the LNG facility at Curtis Island. The pipeline will be 450 kilometres in length, 1070 millimetres in diameter and will be buried underground.

The proponent estimates that the pipeline will take 18 months to construct, commencing in 2012 and concluding in 2013. The gas pipeline construction workforce will reside in TWAFs located along the route of the pipeline. These TWAFs will be constructed, used for approximately two months, deconstructed and moved to a new site—to follow the progression of the pipeline. The proponent acknowledges there will be some reliance on short-term commercial accommodation from contractors, consultants and support services.

It is proposed that the operational workforce for the pipeline will reside in the surrounding towns.

The proponent has indicated that it will develop a Housing and Accommodation Strategy which will include actions designed to mitigate against negative impacts the gas pipeline component of the project will have on the local housing and rental market. The Strategy is discussed further in Section 6.2 of this report.

8.3.2. Workforce and necessary accommodation

Table 8.3 summarises the workforce numbers needed during the construction and operational phases of the gas pipeline and how these workers will be accommodated.



Table 8.3—Summary of Workforce numbers

Workforce type	Peak numbers	Timing	Accommodation
Construction (core workforce)	805	2012-2013	TWAFs will be constructed along the route of the pipeline.
Construction (consultants, contractors and support services)	unknown	2012-2013	Short-term accommodation in surrounding towns.
Operational	20	2013-onwards	Housing stock of towns surrounding the pipeline.

8.3.3. Issues pertaining to workforce accommodation raised by stakeholders

There have been several issues raised by stakeholders that pertain to gas pipeline worker accommodation, including:

- the accommodation should incorporate energy efficient design, be of a high building quality, be built to ensure visual and acoustic privacy for workers and incorporate disability access to meet Australian standards
- the TWAFs should be constructed in a manner that complies with the Queensland Development Code (MP3.3)
- the proponent must ensure that drinking water for workers living at the TWAFs is potable;
- the proponent must ensure that waste from the TWAFs is disposed of appropriately and in accordance with the relevant requirements
- prior to construction of the TWAFs, the proponent consult with the relevant local government and provide:
 - location, nature and extent of facility, and employee numbers
 - layout plans of facilities
 - traffic route plans
 - construction, completion and decommissioning dates; site service proposals, and
 - compensation arrangements for impacts infrastructure
- first aid facilities are available at the TWAFs and that the proponent facilitate orientation visits for relevant emergency services staff
- the proponent should locally source materials to construct the TWAFs and supplies for the workers.
- the sum of workers needed for the construction phase of this and other similar projects in the region is substantial and equates to a significant increase in the population (if only temporarily) for the region,
- those operational workers undertaking activities on the pipeline (who will have to acquire accommodation in the surrounding communities, with their families, if they are not already local residents) are in numbers small enough to not significantly affect the population of the surrounding communities.

8.3.4. Coordinator-General’s conclusions

The Coordinator-General notes the issues raised by stakeholders about worker accommodation required for both the construction and operational phases of the LNG facility component of this project.

Specific conditions relating to the gas pipeline worker accommodation are set in Appendix 3, Part 2 of this report.



8.4. 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 CICSDA and GSDA. MCUs are assessed against the relevant State Development Area Development Scheme.

The Coordinator-General is also the Assessment Manager for all MCU applications in the CICSDA and GSDA. In this report, conditions are nominated 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.

DIP has undertaken work to identify a preferred infrastructure corridor route from east of the Callide Ranges through the CICSDA, to the GSDA, and across the GSDA to Curtis Island to accommodate gas pipelines. Work has also 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. In this latter case the GSDA will be expanded by way of a variation to include the waterway corridor across The Narrows.

It is noted that the APLNG gas transmission pipeline route is within the shared CICSDA and GSDA corridors.

Coordinator-General's conclusion

The proposed gas transmission pipeline must be located in the identified CICSDA and GSDA infrastructure corridors, where applicable. Accordingly, conditions are set in Appendix 3, Part 1. 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 and this matter is dealt further with in Section 8.5.

8.5. The Narrows crossing

8.5.1. The environment

The Kangaroo Island intertidal wetlands and The Narrows are high value marine environments located within the Commonwealth Great Barrier Reef World Heritage Area (GBRWHA) and lie directly adjacent to the State's Great Barrier Reef Coast Marine Park (GBRCMP) to the north.

The APLNG project gas transmission pipeline route from the gas fields to the LNG facility on Curtis Island proposes to cross this environmentally sensitive area. Apart from APLNG, similar crossing routes were chosen by two other LNG proponents (Gladstone Liquefied Natural Gas (GLNG) and Queensland Curtis Liquefied Natural Gas (QCLNG) and it is an option for a third proponent Shell Australia Liquefied Natural Gas (ACSG). The Coordinator-General's EIS evaluation reports were completed for both GLNG and QCLNG in May and June of this year respectively, while ACSG has been declared a significant project and its EIS is expected to be lodged later this year. All are fundamentally similar LNG projects, involving pipeline crossings of Port Curtis to LNG processing facilities on Curtis Island.

The pipelines across the Kangaroo Island wetlands and The Narrows vary among the proponents, in terms of route, as do the proposed construction methodologies. All projects are proposing open trenching for all or part of the total length involved which is approximately 5.4 km; comprising 3.4 km of inter-tidal wetlands around Kangaroo Island and a further 2 km waterway crossing of The Narrows. Crossing The Narrows waterway at the head of Port Curtis is the shortest distance between the mainland and Curtis Island.

Information in the APLNG EIS as well as those of other LNG proponents, indicate that potential acid sulfate soils are more than likely to be a problem if not properly managed. This is particularly so in the intertidal wetlands, where soil disturbance can lead to the creation and release of acid material, which has the potential to cause environmental harm to flora and fauna within the wetlands and surrounding areas including the GBRCMP and GBRWHA. It is critical that the extent of disturbance be restricted and acid producing potential be managed effectively.



The Department of Environment and Resource Management (DERM) and the Department of Employment, Economic Development and Innovation (DEEDI) advise that it may 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 better minimised, monitored and managed effectively by co-locating the pipes and undertaking construction concurrently. The Coordinator-General supports this view.

8.5.2. Co-located construction methodology

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 other environmental impacts. Further work needs to be undertaken to fully assess the construction methodology and environmental impacts. The co-located pipeline approach also provides an opportunity for services such as water supply, sewerage, and telecommunications to be included which will indirectly reduce environment impacts in other areas. This includes obviating the need for multiple reverse osmosis plants on Curtis Island to supply fresh water and obviating the need to dispose of treated sewage into Port Curtis. Advisory agencies have reviewed the report and support investigating the approach.

There is support in principle from LNG proponents for a co-located pipeline construction methodology across the wetlands and The Narrows provided the approach does not compromise individual project timings, costings are reasonable and commercial terms can be successfully negotiated among participants.

To assist in reducing overall pipeline construction timings, it is proposed that 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 separately to allow construction of these segments to proceed independently of the Kangaroo Island wetlands and The Narrows section. 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 approvals are in place for all segments, each participant may apply to have these amalgamated into a combined environmental authority and a combined pipeline licence.

8.5.3. Current position

In the evaluation of the GLNG and QCLNG EISs it was considered that the Kangaroo Island intertidal wetlands and The Narrows are high value marine environments that are more than likely to suffer environmental damage from cumulative impacts, if sequential single pipeline crossings of the area by each of the LNG proponents is undertaken. A series of conditions were imposed requiring proponents to examine the feasibility of a bundled pipeline solution. In summary, proponents were required to report to the Coordinator-General from 1 September 2010 on:

- results of negotiations with other LNG proponents in reaching agreement on a bundled pipeline crossing of the Kangaroo Island wetlands and The Narrows
- an assessment of the feasibility of co-locating water, sewerage and telecommunication services as part of the bundled gas pipelines crossing
- results of consultations with relevant government departments and agencies that would be required to give particular approvals for a bundled gas transmission pipeline crossing
- an assessment of the environmental impacts of the construction and operation of a bundled pipeline and proposed mitigation strategies
- a draft EM Plan covering specific matters.



Reports on the above matters have been received from GLNG and QCLNG and advice received from both APLNG and ACSG outlining their position in relation to a bundled pipeline approach. It is noted that APLNG, in its advice to the Coordinator-General, has indicated a preparedness to participate in a bundled pipeline construction and seeks approval for a single stand-alone pipeline should a bundled approach not proceed.

These reports and advice are currently being assessed, following which, a decision will be given on requirements for co-locating pipelines and the construction sequencing for pipeline segments across the wetlands and The Narrows. The Coordinator-General is unable to make any assessment of impacts of the APLNG pipeline segment across the Kangaroo Island wetlands and The Narrows in this report. To maintain consistency with the requirements in regard to the GLNG and QCLNG projects similar conditions are imposed on APLNG in so far as it is relevant and these are contained in Appendix 3, Part 2.



9. LNG facility

9.1. Overview

The LNG facility will be located on Curtis Island adjacent to Laird Point, within the Curtis Island Industry Precinct of the Gladstone State Development Area. Figure 9.1 shows the plant layout.

Figure 9.1—LNG facility layout





The current layout is a refinement of that presented in the EIS and was provided in the supplemental information with the main changes as follows:

- Material Offloading Facility (MOF)—has been realigned to improve safety and navigation for marine access. It has also been reduced in size, resulting in less reclaimed seabed and now includes an operational ferry terminal.
- Ground flares—the design of the flare system has been modified from two wet/dry ground flares with a stack marine flare, to a five ground flare system that includes wet/dry and marine flaring. Three of the five ground flares will be constructed during the development of trains 1 and 2, with one of three being a spare. At ultimate development, two additional flares will be incorporated in the flare system. The spare unit allows maintenance to occur on the flares without impacting the operation of the plant, thereby increasing plant availability. The revised configuration has the same duty as described in the APLNG Project's EIS, but allows splitting of the flare to multiple smaller units to increase efficiency. The optimised configuration (five ground flare system and the inclusion of the marine flare) has reduced visual impacts to sensitive receptors. It has also reduced heat turbulence at altitude, which reduces potential impacts to aviation safety.
- LNG storage tanks—the revised location of the LNG storage tanks to the south west area within the LNG facility site will result in less generation of boil-off gas during the loading operations and reduced construction effort. This is due to improved foundation suitability and the shorter loading line to the loading berths from the storage tanks.
- Stormwater and discharges—stormwater management improvements and revised discharge point locations have been incorporated into the updated LNG facility layout.
- Acid gas incinerators—acid gas incinerators have been included on the acid gas removal units to allow for any changes in sulphur content of CSG across the life of the project. APLNG has undertaken air dispersion modelling associated with emissions from the acid gas incinerators. Modelling has indicated that air quality objectives for sulphur dioxide are met for normal and non-normal operation of the LNG facility (inclusive of background levels) at sensitive receptors.
- Utility Infrastructure—utility infrastructure has been revised in response to progression of LNG facility design.

The facility is to be designed for four liquefaction trains, each rated at approximately 4.5 million tonnes per annum (Mtpa). The liquefaction plant will include equipment that removes impurities from the incoming natural gas, refrigerates the clean gas, and ultimately turns it into a liquid (LNG) so that it can be more readily stored and transported. Four LNG storage tanks are to be built, each with a 160,000 m³ capacity. The storage tanks are to be full containment with internal pumps, and with all LNG and vapour connections going through the roof (dome) of the tank.

Because of the low heating value of CSG, spiking of the LNG product may be required. To accomplish this, LPG (liquefied propane and/or butane) will be unloaded from ships and stored in one full containment tank.

The LNG facility will use Conoco-Phillips' proprietary Optimized Cascade® technology which is proven, reliable and well suited to coal seam gas application. This technology was used for the Darwin LNG facility in 2006 and is also being proposed by most other LNG proposals in Queensland.

The facility will also include two jetties for loading LNG ships (and unloading LPG ships as required). Submersible pumps located within the LNG storage tanks will pump LNG from the tanks to the jetty head loading platform, where articulated metal loading arms will transfer the LNG cargo to the tank ship.

The facility will also require standard infrastructure services including power, water, telecommunications and sewage disposal. APLNG is proposing to house the bulk of its construction workforce in a TWAF at the north east corner of the site.

An indicative artist's impression of the LNG facility is illustrated in Figure 9.2.

Development is proposed to occur in stages, initially comprising two LNG trains (increasing to four), with each train requiring approximately 250 petajoules of gas per annum to produce approximately 4.5 Mtpa of LNG. The overall facility would have a total capacity of approximately 18 Mtpa of LNG. Initial production of LNG is expected in late 2014 with completion of train 1, with production from train 2 expected by mid 2015 and production from trains 3 and 4 dependant on the LNG market and gas field development but likely around 2017/2018.



Gladstone Ports Corporation will provide the dredging required for shipping access to the LNG facility as part of the Western Basin Dredging and Disposal Project. This will enable access for multiple port uses, including the LNG facilities and loading facilities for future export-oriented industries.

Figure 9.2—Artist's impression of LNG facility—indicative view from west



9.2. Environmental

9.2.1. Terrestrial flora

This section of the report provides an evaluation of the potential impacts of the project on terrestrial flora of state significance as a result of the proposed LNG facility. Matters of national environmental significance are addressed in section 10 of this report. Volume 4, Chapter 8 and Volume 5, Attachment 16 of the EIS addressed terrestrial ecology for the LNG facility.

Flora species

The proposed LNG facility lies wholly within the Curtis Island catchment within the southeast Queensland bioregion. A total of 121 flora species were recorded during EIS field assessments. Of the 121 species, one is listed as 'near threatened' under CITES.

A total of nine Endangered/Vulnerable/Rare (EVR threatened) species of conservation significance (national and/or state significance) were identified within a 10 km radius of the LNG facility site recorded within the pipeline study area through desktop studies. Of the nine threatened EVR flora species, two were listed under the EPBC Act, two were listed under the NC Act, and five were listed under both. No threatened flora species were recorded during the EIS field survey and there are no historical records of these species occurring on Curtis Island; however the EIS considers the proposed LNG facility site to support suitable habitat for two of these species including the large-fruited zamia palm (*Cycas megacarpa*) and quassia (*Quassia bidwillii*).

Although the LNG facility site supports suitable habitat for two threatened species likely to be present—*Cycas megacarpa* and *Quassia bidwillii*, the potential habitat areas of these species on site are not considered to form part of any critical or essential habitat area for these species due to the lack of known populations on the island and isolation from existing populations on the mainland. As such, the EIS concluded the proposed LNG facility site to not contribute significantly to the overall available habitat and range of the species.



In addition to threatened species, the EIS desktop studies identified eight regionally significant species recorded in the proposed LNG facility area. However, the EIS field survey did not confirm the presence of any of those species. The EIS considers it likely that one of the regionally significant species identified to be likely to be present at the proposed LNG facility site—*Eriachne rara*. Although this regionally significant species has not been confirmed as present through EIS field surveys, should this species be found during construction or operational activities, there is potential to impact the species through habitat loss and degradation.

In addition to threatened and regionally significant species, other species of conservation significance identified in the EIS included flora species relating to protected marine plants, cultural significance, commercial significance, recreational significance and weeds. The EIS provides a list of nine marine plants protected under the *Fisheries Act 1994*. Plants of indigenous cultural significance were recorded in the proposed LNG facility area. The EIS identified five flora species of commercial significance. Areas containing plants for which hold value for recreational activities such as fishing and boating are identified in the EIS for the proposed LNG facility area. No timber resources were identified by the EIS to be present at the proposed LNG facility site.

Although the EIS states a number of common flora species at the site are of cultural significance, there is no assessment of the potential impact on these species. The EIS identifies the impacts on recreational fishing values associated with clearing vegetation at the LNG facility site. These include loss of fish breeding grounds and safe boat mooring opportunities. The EIS states that clearing activities are not considered significant to the overall economic value of vegetation on site.

The EIS also identified through desktop studies, seven significant weed species that have the potential to occur within the proposed LNG facility area. This included:

- three Class 2 Declared Weeds under the Queensland Pest and Stock Route Management Act 2002
- four Class 3 Declared Weeds under the Queensland Pest and Stock Route Management Act 2002.

Of these weed species, EIS field surveys confirmed the presence of three of these—rubber vine, lantana and prickly pear.

Increased vehicle and plant equipment movement on the proposed LNG facility site, has the potential to introduce and/or spread weed species. Weeds may out-compete native species therefore potentially reducing biodiversity, altering hydrological and fire regimes and geomorphic processes.

Terrestrial communities

The EIS states that the proposed LNG facility area does not contain any National or Conservation Park, State Forest, Timber Reserve, nature refuge, critical habitat or essential habitat area for threatened flora species or Ramsar-listed wetlands of international significance. The area is located within the Great Barrier Reef World Heritage Area and adjacent to Port Curtis which is listed on the Directory of Important Wetlands in Australia.

The EIS states that 308.3ha of remnant vegetation is present within the LNG facility area. No threatened communities listed under the EPBC Act are present within the LNG facility. Two 'of concern' REs as listed under the VMA—totally approximately 73.4ha, are present within the LNG facility area. Four 'least concern' REs are recorded in the area totally approximately 234.9ha. Table 9.1 summarises the REs present and their extent within the LNG facility area.



Table 9.1—Regional ecosystems located within the proposed LNG facility area

Regional ecosystem	Description	VMA dtatus	Extent within LNG facility (ha)	Proposed clearing (ha)
12.3.11	Queensland blue gum (<i>Eucalyptus tereticornis</i>), grey ironbark (<i>E. siderophloia</i>), pink bloodwood (<i>Corymbia intermedia</i>) open forest on alluvial plains near coast.	Of concern	28.5	23.9
12.11.14	Narrow-leaved red ironbark, Queensland blue gum woodland on metamorphics +/- interbedded volcanics.	Of concern	44.9	26.4
12.1.2	Saltpan vegetation including grassland, herbland and sedgel and on marine clay plains.	Least concern	34.1	29.5
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and esturaries.	Least concern	30.1	1.6–2.3*
12.3.7	Queensland blue gum, pendulous paperbark (<i>Melaleuca fluviatilis</i>) fringing forest.	Least concern	1.4	1.3
12.11.6	Lemon-scented/spotted gum, narrow-leaved red ironbark open forest on metamorphics +/- interbedded Volcanic.	Least concern	169.3	73.1
Total remnant vegetation present within LNG facility site			308.3	
Proposed clearing of remnant vegetation for LNG facility				155.9–156.6*

*Pending final option chosen

The proposed LNG facility requires clearance of approximately 156ha of remnant vegetation, however no clearance of ‘threatened’ communities (EPBC Act), no ‘endangered’ RE (VMA), no vegetation with high biodiversity values and no high value regrowth vegetation (VMA) will be cleared.

The EIS recognises that the proposed LNG facility will impact upon the condition and integrity of vegetation communities at the site. Potential impacts include:

- loss of and/or fragmentation of communities
- increase in ‘edge effects’ and associated changes in microclimates
- changes in floristic structure and composition
- changes in fire regimes
- changes to hydrological regimes
- increased erosion susceptibility.

Mitigation and management—terrestrial flora

The EIS proposes mitigation and management of impacts on terrestrial flora species within the proposed LNG facility site with the aim of avoiding impacts where practicable and minimising the intensity of unavoidable impacts. Strategies include:

- limit vegetation clearing as far as practicable and utilise existing tracks and cleared areas where possible



- incorporate vegetation management issues into the EM Plan including specific measures to reduce impacts during clearing activities
- undertake pre-clearing flora surveys and erosion control measures within remnant vegetation
- where an threatened or regionally significant species is identified on or adjacent to the proposed LNG facility area, species specific management guidelines will be developed and implemented in accordance with the relevant recovery plans
- where an threatened or regionally significant population is identified as large or significant, translocation and relocation strategies will be developed including monitoring programs
- develop and implement a biosecurity management plan for all phases of activities in consultation with relevant regulatory authorities
- include weed and plant disease mitigation measures in the EM Plan as per the biosecurity management strategy
- develop and implement a decommissioning plan including rehabilitation measures and monitoring in consultation with regulatory authorities and relevant stakeholders
- develop a program of offsets for unavoidable impacts.

Coordinator-General's conclusion—terrestrial flora

As outlined in the EIS⁶⁹, APLNG have proposed a number of commitments in relation to terrestrial ecology for the proposed LNG facility. The Coordinator-General supports the adoption of these commitments in the EM Plan.

The EIS proposes mitigation and management of impacts on terrestrial flora species through a vegetation management/monitoring plan. The Coordinator-General supports this approach and requires the Vegetation Management/Monitoring Plan to be included in the EM Plan.

To provide offsets for any unavoidable disturbance of threatened flora species, APLNG is required to develop an offsets program that is approved by DERM and DSEWPC prior to approval and commencement of any LNG facility works.

9.2.2. Terrestrial fauna

This section of the report provides an evaluation of the potential impacts of the project on terrestrial fauna of state significance. Matters of national environmental significance are addressed in section 10 of this report. Volume 4, Chapter 8 and Attachment 16 of the EIS addressed terrestrial ecology for the proposed LNG facility.

Terrestrial fauna species are afforded protection by the *Nature Conservation Act 1994* (NC Act) and the conservation status of fauna in Queensland is listed in the NC(W) Reg.

As a result of desktop studies, a total of 441 fauna species were recorded within the study area. Of the 441 species, 20 were insects, 26 fish, 25 amphibians, 66 reptile, 245 bird and 59 mammals. In addition to desktop studies, a field assessment was undertaken. Field assessments resulted in a total of 48 species being recorded. These comprised of one amphibian, six reptiles, 38 birds and three mammals.

A total of 31 Endangered/Vulnerable/Rare (threatened) fauna species of conservation significance (national and/or state significance) were recorded within the proposed LNG facility area through desktop studies. These comprised of four reptile, 20 bird and seven mammal species. Of the 31 threatened fauna species, two were listed under the EPBC Act, 17 were listed under the NC Act, and 12 were listed under both. Field studies confirmed the presence of two of the threatened fauna species in the LNG facility area. In addition to threatened species, eight species that are not listed under the relevant legislation however are ranked as 'critical' or 'high priority' under the Back on Track species prioritisation framework have been included in the EIS as threatened species.

⁶⁹ EIS: Volume 1 Chapter 6 (section 6.3.6) and Volume 4 Chapter 8 (section 8.8.2) of the EIS



The EIS⁷⁰ also stated that no significant impact is likely to occur to these species, due to the minimal extent of clearing likely to occur, compared to the overall area available to these species. 25 of the 31 threatened species are considered to potentially utilise habitats within the proposed LNG facility area. Of these 31 threatened fauna species, the EIS⁷¹ stated that 11 species could be directly affected. The EIS also stated that due to the overall fauna habitat available adjacent to and within the vicinity of the proposed LNG facility site.

In addition to threatened fauna species, the EIS identified through desktop studies an additional 49 species of regional significance. These comprised of three fish, nine amphibians, 13 birds, 11 reptiles and 13 mammals. Of the 49 species, one of the mammal species is listed as 'high priority' under the Back on Track program. The EIS states that 43 of the 49 regionally significant species are considered to potentially utilise habitats within the LNG facility area. Field studies confirmed the presence of one of the regionally significant species as occurring at the site.

In addition to threatened and regional significant fauna species, an additional 52 migratory bird species were identified in the EIS as recorded in the wider study area. Although not threatened fauna species, these are Matters of National Environmental Significance (MNES) and therefore are addressed in section 10 of this report.

The EIS identified through desktop studies, 256 common native fauna species as potentially present within the proposed LNG facility area. These comprised of 20 insect, 15 amphibians, 21 fish, 51 reptile, 121 bird and 28 mammal species.

The EIS identified 16 introduced fauna species within the proposed LNG facility area including two fish, one amphibian, three birds and ten mammals. Field inspections observed three introduced fauna species present within the LNG facility area.

The EIS categorised the habitats in the proposed LNG facility area into seven broad faunal habitats. These included:

- eucalypt woodland
- paperbark wetland
- saltpans
- mangroves
- North Passage Island
- beach/foreshore, and
- tidal mud flats.

The EIS acknowledges that impacts on fauna habitats will occur as a result of the proposed LNG facility. The EIS⁷² stated that considering the extent and location of proposed clearing, direct impacts are not likely to be reversed. However, the EIS⁷³ also stated that similar fauna habitat present adjacent to the LNG facility site would be of sufficient size to cope with the increase in fauna, such that long-term impacts are unlikely to be significant.

The EIS acknowledge impacts on terrestrial fauna as a result of the proposed LNG facility include:

- removal of mature habitat including hollow-bearing trees
- edge effects
- potentially unearthing burrowing fauna during construction
- disorientation and behaviour changes due to artificial lighting impacts,
- disturbance of migratory shorebird habitat.

Overall impacts on fauna as a result of the proposed LNG facility are considered in the EIS to be unlikely to result in a significant long-term impact due to similar habitats available in adjacent areas.

⁷⁰ EIS: Volume 5 Attachment 16, Section 4.2.3

⁷¹ EIS: Volume 5 Attachment 16, Section 4.2.3

⁷² EIS: Volume 5 Attachment 16, Section 4.2.1

⁷³ EIS: Volume 4 Chapter 8, Section 8.4.2



Mitigation and management—terrestrial fauna

The EIS proposes mitigation and management of impacts on terrestrial fauna species within the proposed LNG facility site with the aim of avoiding impacts where practicable and minimising the intensity of unavoidable impacts. Strategies include:

- undertake a pre-clearance inspection to identify potential nesting or roosting sites. If present, construction will be timed to avoid nesting and reproduction seasons, where reasonably practicable
- develop clearing procedures which take into consideration fauna impacts
- ensure a fauna spotter/catcher is present during clearing
- retain hollow bearing trees wherever practicable. Where unavoidable, a clearing plan will be developed that allows time for fauna to move away. All hollows will be inspected prior to clearance and removed hollows will be placed in retained vegetation
- develop and implement a biosecurity management plan including feral fauna control
- utilise sensitive lighting technology and techniques
- limit access to tidal mudflat areas
- develop a mosquito management plan prior to construction
- minimise the clearance footprint, avoiding removal of mature vegetation
- trim branches where possible rather than removing the tree
- incorporate rehabilitation measures into environmental management plans
- develop a vegetation offsets policy.

Coordinator-General's conclusion—terrestrial fauna

The EIS⁷⁴ stated that APLNG has proposed a number of commitments in relation to terrestrial ecology for the proposed pipeline. The Coordinator-General supports the adoption of these commitments in the EM Plan.

The EIS proposes mitigation and management of impacts on terrestrial fauna species through a vegetation management/monitoring plan. The Coordinator-General supports this approach and requires the Vegetation Management/Monitoring Plan to be included in the EM Plan.

To provide offsets for any unavoidable disturbance of fauna species habitats, APLNG must develop an offsets program that is approved by DERM and DSEWPC prior to approval and commencement of any LNG facility works.

9.2.3. Marine habitats

This section of the report provides an evaluation of the potential impacts of the project on marine habitats of state significance as a result of the LNG facility. Matters of national environmental significance are addressed in section 10 of this report. Volume 4, Chapter 10 and Volume 5, Attachment 20 of the EIS addressed marine ecology for the LNG facility.

The legislative framework surrounding marine ecology consists of both State and Commonwealth legislation. The relevant Commonwealth legislation and matters of national environmental significance are addressed in section 10. The relevant State legislation applied to the marine ecology of the proposed pipeline includes:

- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- EP Act
- *Coastal Protection and Management Act 1995*.

The marine environment relevant to the proposed LNG facility is the western side of Curtis Island which is located within Gladstone Port limits. Below the mean low water mark, the marine environment is considered located within the Great Barrier Reef World Heritage Area. Wetlands that will be disturbed as a result of the proposed LNG facility are areas of 'state significance (natural resources)' under the State Coastal Plan.

⁷⁴ EIS: Volume 1, Chapter 6, Section 6.3.6 and Volume 4, Chapter 8 Section 8.8.2



The EIS stipulates that the primary environmental features of interest in the vicinity of the proposed LNG facility are:

- seagrass meadows—a small seagrass bed consisting of patches of *Zostera capricorni* occurs
- mangroves—fourteen species of mangroves are reported in the Port Curtis region. These mangrove communities are considered to be in a healthy state
- saltmarsh areas including saltpans and mudflats
- intertidal rocky shores—these occur in the vicinity of the proposed LNG facility and associated marine infrastructure.

EIS field studies demonstrated that the subtidal area in the vicinity of the proposed LNG facility is principally bare substrate with high amounts of shell and rubble material.

Commercial fishing occurs in the Port Curtis area, primarily net and mud crabbing but also beam trawling. Recreational fishing occurs in the Port Curtis area. It is anticipated that the number of recreational fishers will increase as a result in the increase in residents in the region. Due to safety exclusion zones, the EIS predicts that the proposed LNG facility will result in a loss of fishing access to both recreational and commercial fisheries. However, the EIS states that the risk to fishing access is considered low.

The EIS indicates that the proposed LNG facility requires an estimated reclamation of 2.4ha of mangroves and 24ha of saltpan/saltmarsh. This represents 0.03 per cent of mangrove cover and 0.5 per cent of saltpan/saltmarsh habitat in the Port Curtis region. The EIS identifies habitat fragmentation as a potential impact of construction of the proposed LNG facility. The EIS predicts that the reclamation of habitat for the construction of the proposed LNG facility will pose an overall medium risk to the Port Curtis marine environment.

Mitigation and management—marine habitats

The EIS proposes mitigation and management of impacts on marine habitats within the vicinity of the proposed LNG facility through the following actions:

- The LNG plant footprint boundaries have been chosen to minimise the removal of mangrove habitat. A large stand of mangroves and a small mangrove lined creek in the centre of the site is proposed to be left undisturbed.
- Consideration will be given to mitigation and offsets for sensitive marine fish habitat as per the Queensland Fish Habitat Management Operational Policy (2002) and local fishing stakeholder liaison.
 - Compensatory activities may be carried out off-site but in the region.
 - Compensatory activities may be part of a state-wide compensation program.
 - Offsets may be at the local/regional level.
- Investigate the installation of inshore artificial reefs as an offset to fish habitat loss.
- Investigate offsets for loss of fishing access in conjunction with stakeholder consultation.
- Utilise community monitoring of fisheries habitat where appropriate pre and post construction.
- Work with State government, Gladstone Ports Corporation and other proponents to achieve an outcome that minimises cumulative impacts.

The EIS assesses the residual risks associated with the proposed LNG facility on marine ecology as ranging from low to medium.

Coordinator-General's conclusion—marine habitats

As outlined in the EIS⁷⁵, APLNG proposed a number of commitments in relation to marine ecology for the proposed LNG facility. The Coordinator-General supports the adoption of these commitments in the EM Plan.

⁷⁵ EIS: Volume 1, Chapter 6, Section 6.3.8



Similar to the approach adopted to manage terrestrial ecology impacts in the EIS, the Coordinator-General supports the management of marine ecology impacts through a vegetation management/monitoring plan. The Vegetation Management/Monitoring Plan must be included in the EM Plan.

To provide offsets for any unavoidable disturbance of state significant marine ecological communities, APLNG must develop an offsets policy that is approved by DERM and DSEWPC prior to approval and commencement of any LNG facility works.

9.2.4. Marine fauna

This section of the report provides an evaluation of the potential impacts of the LNG facility on marine fauna of state significance. Matters of national environmental significance are addressed in section 10 of this report. Volume 4, Chapter 10 and Volume 5, Attachment 20 of the EIS addressed marine ecology for the LNG facility.

The legislative framework surrounding marine ecology consists of both State and Commonwealth legislation. The relevant Commonwealth legislation and matters of national environmental significance are addressed in section 10. The relevant State legislation applied to the marine ecology of the proposed LNG facility includes:

- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- *Nature Conservation Act 1992*
- EP Act
- State Coastal Management Plan.

The marine environment relevant to the proposed LNG facility is the western side of Curtis Island which is located within Gladstone Port limits. Below the mean low water mark, the marine environment is considered located within the Great Barrier Reef World Heritage Area. Wetlands that will be disturbed as a result of the proposed LNG facility are areas of 'state significance (natural resources)' under the State Coastal Plan.

The Port Curtis region, within which the LNG facility is proposed, includes extensive wetland habitats which support species of state conservation significance. The EIS identifies a number of marine fauna species of state conservation significance which may exist within the proposed LNG facility region. These include:

- dugong—listed as 'vulnerable to extinction' under the NC Act and 'vulnerable' under the International Union for the Conservation of Nature (IUCN)
- marine turtles—species listed as 'vulnerable' or 'endangered' under the NC Act
- cetaceans (whales and dolphins)
- sea snakes
- macrobenthic infauna
- plankton,
- fish and invertebrates.

The area adjacent to the proposed LNG facility site is declared a 'Dugong Protection Area B' under the NC Act. 'Dugong Protection Area B' is the second most important area under the legislation and represents less significant but still important habitat.

The EIS identifies Flatback turtles, Green turtles and Loggerhead turtles as likely to nest in the vicinity of the proposed LNG facility. These are listed as 'vulnerable' and 'endangered' under the NC Act.

The EIS identifies the Indo-Pacific humpback dolphin, the Australian snubfin dolphin and the Bottlenose dolphin as species known to occur adjacent to the proposed LNG facility.

The EIS suggests that it is likely that the elegant seasnake, the spine-bellied seasnake, and the small headed seasnake are likely to occur in the vicinity of the proposed LNG facility.



Based on a literature review, the EIS makes the assumption that the rock and reef habitat within Port Curtis is likely to be utilised by a range of fish species including yellowfin bream, sweetlip, estuary cod, and blubber-lip bream. In addition, invertebrate species including portunid crabs, juvenile prawns, and mud crabs are assumed to exist in the Port Curtis marine habitats.

Impacts on marine fauna associated with the proposed LNG facility are identified in the EIS as:

- habitat fragmentation
- habitat reclamation
- boat strike
- underwater noise,
- lighting.

The EIS states that marine fauna may potentially be impacted by the construction of the proposed LNG facility and associated marine infrastructure through the fragmentation of marine habitat.

The EIS predicts the reclamation of habitat for the construction of the LNG facility will pose a medium risk to the Port Curtis marine environment.

The proposed LNG facility has the potential to cause injury and/or mortality to dugong and marine turtles through boat strike. However due to the use of slow moving vessels for the project, the LNG facility is considered to pose a low risk of boat strike to marine fauna. Where fast ferries are proposed to service the LNG facility, the EIS estimates the risk of boat strike at a medium level providing mitigation measures are in place.

Dugong and cetaceans may be impacted by underwater noise created as a result of the proposed LNG facility activities. Behaviour changes and displacement from critical habitat can occur as a result of underwater noise. The EIS predicts that underwater noise impacts on dolphins will be limited to the construction phase. The EIS also suggests that impacts on dugongs will be low due to adjacent habitat areas unaffected by the LNG facility impacts are available in the region.

The EIS considers the impacts on marine fauna due to the proposed LNG facility lighting to be plausible but unlikely.

Mitigation and management—marine fauna

The EIS proposes mitigation and management of impacts on marine fauna within the vicinity of the proposed LNG facility through the following actions:

- consideration will be given to mitigation and offsets for sensitive marine fish habitat as per the Queensland Fish Habitat Management Operational Policy (2002) and local fishing stakeholder liaison
 - compensatory activities may be carried out off-site but in the region
 - compensatory activities may be part of a state-wide compensation program
 - offsets may be at the local/regional level
- investigate the installation of inshore artificial reefs as an offset to fish habitat loss
- monitor the usage of the area adjacent to the LNG facility by dolphins and dugong prior, during and after construction. If impacts persist, additional corrective actions will be considered
- establish a process for visual observations and recording of dugongs and cetaceans
- limit boat speeds, use predefined and regular routes, and use propeller guards in key locations where dugong and marine turtles frequent
- investigate and work with stakeholders to develop an industry wide approach to boat strike mitigation
- investigate and utilise noise suppression technologies (such as air-bubble curtain system, cushion block and “soft” starts) during piling of the LNG loading
- design and implement a sensitive lighting approach at the LNG facility
- develop a construction methodology that will minimise disturbance
- utilise community monitoring of fisheries habitat where appropriate pre and post construction.



The EIS assesses the residual risks associated with the proposed LNG facility on marine ecology as ranging from low to medium.

Coordinator-General's conclusion—marine fauna

APLNG have proposed a number of commitments (outlined in the EIS⁷⁶) in relation to marine ecology for the proposed LNG facility. The Coordinator-General supports the adoption of these commitments in the EM Plan.

Similar to the approach adopted to manage terrestrial ecology impacts in the EIS, the Coordinator-General supports the management of marine ecology impacts through a construction environmental management and an operations environmental management (Appendix 4, Part 3, Conditions 1 and 2).

To provide offsets for any unavoidable disturbance of state significant marine fauna species habitats, APLNG must develop an offsets program that is approved by DERM and DSEWPC prior to approval and commencement of any LNG facility works (Appendix 4, Part 3, Conditions 1 and 2).

9.2.5. Amenity and safety

Air quality

The EIS provided information studies that identified potential effects of the LNG facility on the Gladstone air-shed⁷⁷. From an amenity perspective the emissions are those that cause nuisance, such as dust, smoke and odour, or otherwise reduce the visual qualities of the region, most likely in terms of particulates in dust or smoke. Climatic conditions affect the intensity, duration and catchment of the air pollution.

Air emissions including waste gases and fine particulates also pose risks to human health and safety. In this regard ambient air quality standards have been established to benchmark safe living conditions for normal and sensitive receptors. DERM has not set requirements on the emissions from fuel burning equipment, however, best practice environmental management is required to minimise emission of pollutants.

Construction phase

Sources of emissions will be from the extensive construction activities on Curtis Island including excavation, earthmoving, road works and associated mobile equipment and operation of power generators. Approximately 10MW of construction power will be supplied by diesel generators. In addition, the 10MW generation system will be supported by adequate backup power to ensure critical activities and electronic equipment continue to be powered should a blackout of the main system occur.

The Curtis Island construction site is some 10 km from the nearest off-site sensitive receptor, however, the distance from the construction areas to the temporary workers accommodation facilities (TWAF) on the Island would be between 500 and 1,000 metres. At peak construction workforce, the TWAF is expected to house approximately 2,600 workers.

It is noted that if all of the other proposed CSG-LNG plant proposals proceed, the total domiciled population on Curtis Island could be of the order of 8000 to 10 000 during construction peaks.

Over the construction period of nine years, some areas of the site will be fully functional, such that air quality 'amenity issues' will primarily be associated with management of emissions to protect the health of the large workforce on the island. In this regard, the focus of the EIS and supplementary studies has been to determine ground level concentrations of air pollutants, to ensure that the design of the LNG plant could maintain emissions at levels below the EPP Air objectives during normal operations, accounting for other sources (particularly of NO₂) and other LNG facilities nearby.

⁷⁶ EIS: Volume 1, Chapter 6 Section 6.3.8

⁷⁷ EIS: Volume 4 Chapter 13



The EIS stated that the TWAF would be outside any harmful heat radiation or overpressure zones in a catastrophic explosion or fire on the island. However, emissions could still be harmful to the workforce if not controlled. In this regard, the EIS stated that the LNG facility will make use of a variety of technologies and practices to control and minimise gaseous wastes⁷⁸.

These measures will include:

- use of CSG as the fuel source where practicable, in preference to liquid or solid fuels
- use of power generators equipped with dry low NO_x technology, and aero-derivative gas turbine drivers equipped with dry low emission (DLE) technology
- use of waste heat recovery to supply process heat
- capture and re-liquefaction of excess gas generated during ship loading in the LNG process rather than being flared. Which will reduce emissions resulting from the burning of this gas stream, whilst preserving CSG resources
- use of closed-loop sampling systems to minimise fugitive emissions.

Operational phase

The LNG facility will utilise CSG for power generation in order to be self-sufficient in power requirements. Electrical power will be generated onsite to supply electricity for LNG processing and the common utility and off-facility areas.

Power for the four train facility will be provided by gas turbine generator sets. The number and manufacturer of the generators are preliminary and will be finalised during the FEED phase of the project. However, APLNG is still optimising the turbine configuration including the potential use of 14 turbines. The proposed Solar Titan 130 generators are rated at 15MW each. When fully functional the generator capacity for the 4 trains would be 500 MW.

Power generators will be equipped with dry low NO_x technology and aero-derivative turbine drivers equipped with DLE technology. Low sulphur, diesel powered, generators with dedicated battery systems will be provided in addition to an uninterruptible power supply and emergency backup power system.

In summary, the EIS identified air quality risks and proposed design measures and safeguards to mitigate risks. Cumulative air modelling studies undertaken in support of the proposal concluded that all air quality objectives would be met for normal and non-routine operation of the APLNG facility (inclusive of background levels) at sensitive receptors for NO₂, CO, PM₁₀, PM_{2.5}, odour, ozone, SO₂ and hydrocarbons⁷⁹. However, given the proximity of the TWAF to the operational facilities on Curtis Island, specific conditions are set in Appendix 4, Part 4 in protecting the health and amenity of the workforce.

The EIS also stated the proponent's commitments to adopt specified air emission mitigation measures and safeguards. These measures are reproduced in this report at Appendix 6.

Noise

Construction activities would initially involve extensive reclamation, civil engineering (including piling), fabrication and building works. Noise sources would include mobile and stationary equipment emitting continuous engine noise, intermittent impact noise and signal noise.

The EIS stated the following distances from the centre of the LNG site to noise sensitive receptors:

Receptor	Description	Approx distance
• Passage Islands	2 isolated dwellings	6.2 and 7.2 km
• Fishermans Road	1 isolated dwelling	7.8 km
• Targine Road	20 rural residential dwellings	8.7–10 km
• Gladstone City	Large population centre	10.9 km
• South End	Residential community	11.9 km

⁷⁸ EIS: Volume 4, Chapter 3

⁷⁹ EIS: Volume 5 Attachments, Section 1, Executive Summary.



Supplementary information indicated the distance from the construction site areas to the TWAF on the Island would be between 500 and 1,000 metres.

While the EIS and supplementary information focused on 'off-site' noise receptors, it is noted that the comfort and well-being of the domiciled construction workforce will need to be properly protected within the TWAFs on Curtis Island. In this regard, specific conditions are set in Appendix 4, Part 4.

Landscape and visual amenity

The visual impact of the LNG plant development has the potential to have much more major and long-term presence. However, the changes that will permanently alter the landscape will become part of a much larger industrial landscape that will be created on Curtis Island (Gladstone State Development Area, Curtis Island Industry Precinct). The distance from mainland view points is several kilometres and activities and structures will generally be at low elevations. More prominent, will be the movement of very large LNG carriers in Port Curtis.

The visual amenity is also currently valued from recreational boating use, although there is now general recognition that opportunities for recreational boating will change as the Curtis Island Industry Precinct changes south of The Narrows.

The EIS stated that Curtis Island visual amenity has been mapped in the Curtis Coast Regional Coastal Management Plan and that Map 10 of that Management Plan does not place prominence on the LNG development sites⁸⁰.

Safeguards to be adopted to mitigate adverse visual impacts include:

- reduce, as far as practical, the cleared areas needed to support the construction and operation of the LNG provision
- reduce the penetration of the mangrove fringe at the MOF to the essential width to accommodate the water interface facility
- where practicable, retain mangroves and develop the wider storage areas behind the mangrove fringe
- landscape cut and fill batters to reduce colour contrast with adjoining vegetation using colours that are in the natural palette of colours on the Island
- any building that is not compromised with regards to heat absorption will be painted to lessen the contrast between these elements and the adjoining bushland. Surface finishes should generally have low reflectivity
- use a sensitive lighting approach to reduce light spill—utilise ground flares to reduce visual impact—evaluate the outcomes of lights that have a lower elevation to achieve the required light levels to assist in lowering the height of light towers
- active involvement in the management of the Curtis Island environmental management precinct.

In the EIS, APLNG has committed to adopting safeguards that to avoid or minimise the impacts to visual amenity. The Coordinator-General is generally satisfied with these commitments; however, it is noted that the risk of visual impact could be further reduced by not placing structures on elevated areas on Curtis Island that might cause a visual intrusion on the island profile. For example, water tanks should be set below hill crests.

9.2.6. Discharge to Port Curtis

APLNG has advised that, at Curtis Island, it will need to discharge brine from the desalination plant, effluent from the sewage treatment plant (STP), treated stormwater and process water from plant areas. APLNG has further advised that when water supplies are sourced by pipeline from the mainland, such water supplied, would be raw water and would require treatment to meet to meet all process operational requirements. DERM has advised that the Magnetic Island Sewage Treatment Plant discharge conditions are its current benchmark requirements for marine discharge. APLNG has committed to implementing tertiary treatment of sewage, with reduced nitrogen and phosphorous levels.

⁸⁰ EIS Volume 4 Chapter 7 Figure 7. 3 Areas of state significance (scenic coastal landscapes)



DERM has identified issues about other potential pollutants in the discharge stream, including hydrocarbons. It requires detailed information on all chemical inputs and outputs to effluent streams to fully understand the process management system and to ensure that EA conditions can be set to minimise the risk of environmental harm. DERM's policy position is that there should be no toxicity to biota in the mixing zone of marine discharges. This policy has been adopted since the Gladstone Pacific Nickel project approval and has been applied to the GLNG and QCLNG project conditions.

A condition on this matter is set at Appendix 4, Part 2, Condition 8.

9.3. Workers accommodation—LNG facility

9.3.1. Introduction

The LNG facility will be located on Curtis Island, adjacent to Laird Point, within the Curtis Island Industrial Precinct of the Gladstone State Development Area. The site will include gas processing facilities to purify and refrigerate the gas, condensing it to liquid at low pressure. The site will also include product storage tanks and standard ancillary infrastructure including power, water, telecommunications and sewage disposal.

The proponent has indicated that it will develop a Housing and Accommodation Strategy, which will include actions designed to mitigate against negative impacts the influx of workers for the LNG facility component of the project will have on the local housing and rental market. The Strategy is discussed further in section 6.2 of this report.

The workforce required during the construction phase of the LNG site will peak at 3,300 in 2013. The proponent estimates that local workers will account for 20 per cent of the total construction phase workforce (660 workers), with the rest of the labour (2640 workers) engaged in a fly-in/fly-out basis and housed at the TWAF on Curtis Island.

The operational workforce is estimated to peak between 2018 and 2020 at 325 people. The proponent indicates the core operational workforce will comprise a mixture of existing local residents and non-local workers who may choose to relocate to Gladstone.

As well as the core operational workforce, additional workers will be required to perform scheduled maintenance shutdowns at the LNG facility. There will be two types of shutdown maintenance:

1. major shutdowns (occurring every few years)—requiring up to 500 additional workers
2. minor shutdowns (occurring more frequently)—requiring up to 100 additional workers.

It is planned for these additional maintenance workers to be accommodated in existing mainland TWAFs and the TWAF on Curtis Island.

9.3.2. Workforce and necessary accommodation

Table 9.2 summarises the workforce numbers needed during the construction and operational phases of the LNG facility and how those workers will be accommodated.



Table 9.2—LNG facility workforce and accommodation

Workforce type	Peak numbers	Timing	Accommodation
Construction (imported: fly-in/fly-out)	2,640	2013	TWAF on Curtis Island.
Construction (local residents already living in Gladstone)	490	2013	Already residing in the housing stock of Gladstone.
Construction (new residents to Gladstone)	170	2013	Will need to acquire housing from the existing stock in Gladstone.
Operational (core workforce)	325	2018-2020	Housing stock of Gladstone (there will be a mixture of local residents already residing in Gladstone and non-local residents needing to acquire housing).
Operational (maintenance workforce—major shutdown)	500	Every few years	TWAFs on Curtis Island and TWAFs on the mainland
Operational (maintenance workforce—minor shutdown)	100	More frequent than major shutdown	TWAFs on Curtis Island and TWAFs on the mainland.

9.3.3. Issues pertaining to worker accommodation raised by stakeholders

There have been several issues raised by stakeholders that pertain to LNG facility accommodation, including that:

- the accommodation should incorporate energy efficient design, be of a high building quality, be built to ensure visual and acoustic privacy for workers and incorporate disability access to meet Australian standards
- the TWAFs should be constructed in a manner that complies with the Queensland Development Code (MP3.3)
- the proponent must ensure that drinking water for workers living at the TWAFs is potable
- the proponent must ensure that waste from the TWAFs is disposed of appropriately and in accordance with the relevant requirements
- prior to construction of the TWAFs, the proponent consult with the relevant local government and provide:
 - location, nature and extent of facility, and employee numbers
 - layout plans of facilities
 - traffic route plans
 - construction, completion and decommissioning dates; site service proposals, and
 - compensation arrangements for impacts infrastructure
- first aid facilities are available at the TWAFs and that the proponent facilitate orientation visits for relevant emergency services staff
- the proponent should locally source materials to construct the TWAFs and supplies for the workers.
- the sum of workers needed for the construction phase of this and other similar projects on Curtis Island is substantial and equates to a significant increase in the population (if only temporarily) for the region
- approximately 170 new families will re-locate to Gladstone for the construction phase of the LNG project, requiring housing



- the core operational workforce will comprise a mixture of existing local residents and non-local workers who may choose to relocate to Gladstone. It is inevitable that a proportion of the core operational workforce will re-locate to Gladstone (with their families) and require housing,
- there will periodically be a significant influx of maintenance workers (up to 500) to the LNG facility.

9.3.4. Coordinator-General's conclusions

The issues raised by stakeholders about worker accommodation required for both the construction and operational phases of the LNG facility component of this project, are noted.

The majority of the construction workforce (approximately 2640 workers) will be imported and accommodated at the TWAF on Curtis Island. It is noted that this is an increase to the 1500 workers originally indicated would be appropriate to reside on Curtis Island for this project. The Coordinator-General will consider this proposed increase to the TWAF at the Material Change of Use application stage of the LNG facility.

Specific conditions relating to the LNG facility worker accommodation are set in Appendix 4, Part 1 of this report.

9.4. Dredging

The project requires construction of wharf and jetty structures to enable the loading of the LNG vessels.

Dredging required for shipping access to the LNG facility is subject to a separate development approval process for an application lodged by Gladstone Port Corporation, as part of the Western Basin Dredging and Disposal Project (WBDDP).

The scope of the WBDDP would include capital and maintenance dredging and dredge material disposal requirements for shipping channels, berth pockets and the approach channel to the marine off-loading facility (MOF).

Relatively minor dredging additional to that described above will be required for construction of marine infrastructure, including the early construction facilities, a roll-on –roll-off dock, MOF, jetty, wharfs and a ferry terminal to enable the transfer of personnel, materials and heavy equipment to the project site for construction and operations. The disposal of this dredge material will be at location(s) approved under GPC's approved projects such as the WBDDP.

The EIS reported that the volume dredged for this marine infrastructure is approximately 900,000m³ and the dredge spoil produced would have qualities suitable for unconfined placement at sea, according to the NAGD contaminant assessment framework. The material is also suitable for placement on land, according to the DEH (1998) guidelines.

Supplementary EIS information indicated that APLNG anticipates Gladstone Port Corporation (GPC) would undertake this dredging on its behalf and that disposal of all dredge material within the scope of the APLNG's EIS would be at location(s) approved within GPC's approved projects (such as the Western Basin Dredging and Disposal Project).

DERM has advised that the main issues will be in relation to the type of dredge used and the disposal of the spoil. At this stage, the APLNG modelling of impacts (Supplementary information—LNG Coastal Environment) is based on using a cutter suction dredge with pumping direct to the reclamation area north of Fishermans Landing. Any change to this would require a reassessment of potential impacts.

APLNG advises it has updated the EIS dredge plume modelling to account for the additional marine construction facilities. The modelling includes the assessment of cumulative impacts from the Western Basin Dredging project dredging, assuming a worst case scenario involving coincident dredging activities. Results from modelling indicate the sediment plumes (up to a maximum of 0.5kg/m³ total suspended solids) have a very short duration and are focused on the eastern side of The Narrows. DERM has indicated that reducing the dredging of inshore high sulfur content material is desirable (and placing fill over PASS is preferred). Moving the berths seawards may assist in achieving this; however, there are navigational requirements that must be met as well.



A recommendation is included in Appendix 4, Part 2, that the administering agency set the same conditions for the ancillary infrastructure dredging as that specified for the WBDDP.

9.5. Material change of use

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, conditions are specified that should attach directly to any MCU approvals for the LNG plant at Appendix 4, Part 1.

9.6. Hazard and risk

9.6.1. Issues of concern

The principal hazard and risk scenarios for the LNG facility involve the operation of the plant, loading of LNG, unloading of LPG and shipping of LNG through the port of Gladstone. A number of submissions for the APLNG project as well as previous LNG projects queried the explosion and fire potential from LNG plant operations, and the consequences of shipping collisions in the harbour. Risks during construction were seen as a secondary order of magnitude. However, there were major issues raised for safety of a workforce housed on site, not during initial construction, but during subsequent construction programs of second and subsequent trains when the either site, or a neighbouring site, is operating. This latter aspect was raised by APLNG in its submission in regard to impacts from the operation of APLNG's ground flares on APLNG's proposed TWAF.

9.6.2. Risk assessment

The EIS has undertaken a systematic hazard identification study considering potential hazards and environmental problems that could arise with the project. Consideration has been given to construction and operational hazards, aviation safety, environmental hazards, external hazards and transport and traffic hazards amongst others. The bulk of these hazards and risks have been addressed in other sections of this report. This section specifically deals with the operation of the LNG plant and shipping risks within the Port of Gladstone.

Shipping

Quantitative risk analysis of the port transit considered collision, grounding, striking and total impacts. Allowing for the operational characteristics and layout of Gladstone Harbour, the likelihood of an incident is low and because of the double hull design, the chance of a loss of containment from an LNG vessel grounding in Gladstone Harbour is considered to be less than 2.1×10^{-6} per visit. This is low compared with the acceptable planning criteria for fatality risk in residential areas of 1×10^{-6} .

The EIS quotes reports indicating that no loss of containment from double hull LNG vessels have been experienced in the past 25 years of worldwide shipping. 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 minimum 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 250m would be satisfactory. This corresponds to the Quantitative Risk Assessment 50×10^{-6} contour for fatality risk which is considered by planning criteria as acceptable for industrial areas.



LNG plant operation

The EIS indicated that the hazards from operations of the LNG plant are analysed in four ways:

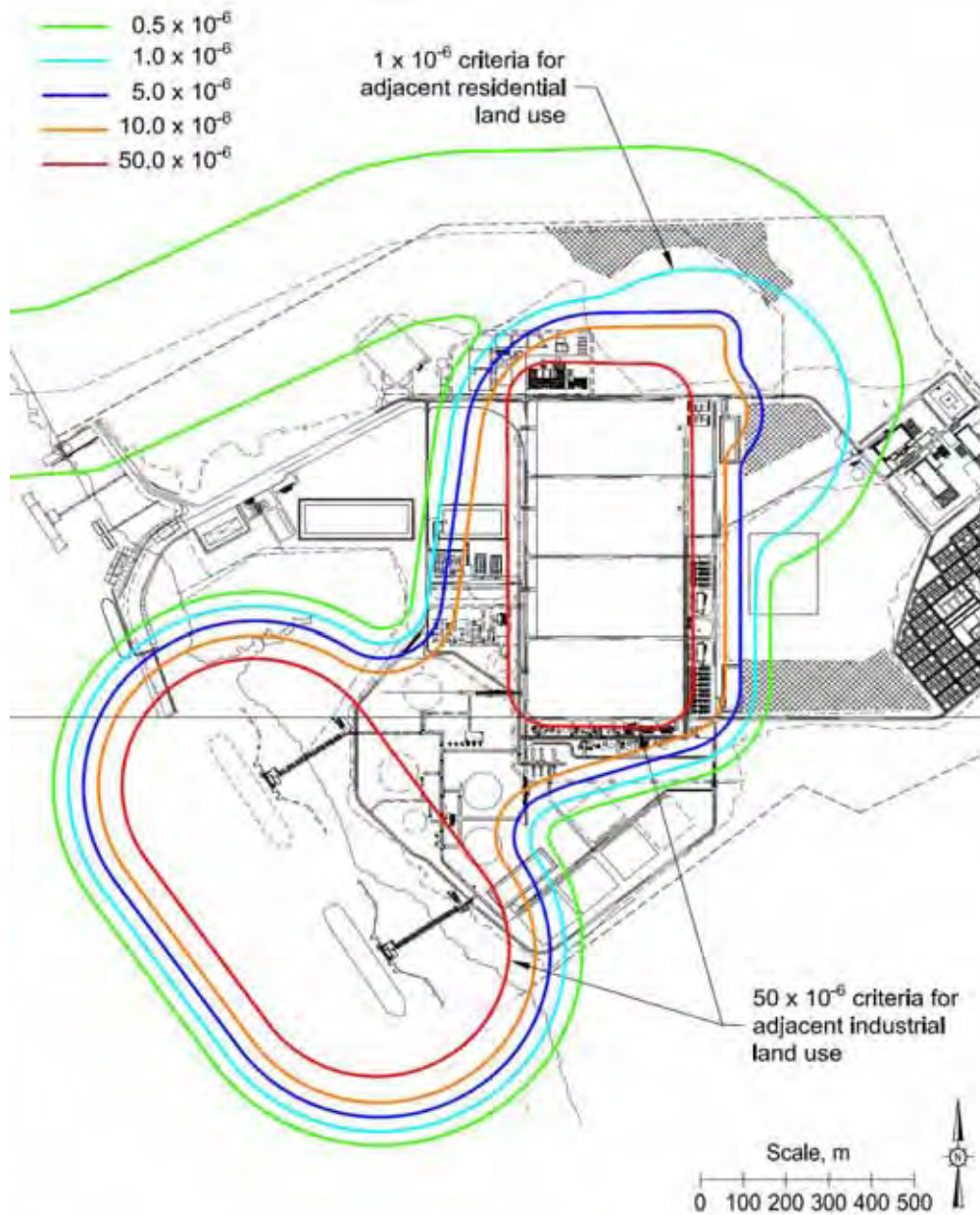
- fatality risk contours taking likelihood and consequence into account
- overpressure from explosions
- heat flux from fires
- vapour cloud flammability.

A risk assessment according to Australian Standard AS/NZS ISO31000 was conducted and the fatality risk contours from all hazards were drawn on the plant site layout, covering probabilities from 50×10^{-6} (Industrial risk criteria) down to 0.5×10^{-6} (sensitive developments). The accepted Australian risk criteria for land use planning are drawn from the *New South Wales Hazards Industry Planning Advisory Paper No 4, 2008 (HIPAP4) Risk Criteria for Land Use Safety Planning*. The acceptable risk criteria for residential areas is 1×10^{-6} per year.

The fatality risk assessment in the EIS was revised in the supplementary material based on the revised LNG plant layout and these results are shown at Figure 9.3. All contours, including the acceptable residential risk criteria of 1×10^{-6} per year, lie within the land site boundaries of the LNG plant apart from a very small area at the south east corner. It is noted that the APLNG TWAF and QGC TWAF on the adjacent site lie well outside the acceptable residential land use risk contour. Risk contours over water surrounding the ship loading berths are contained within the 250 metres exclusion zone agreed with GPC, MSQ and other LNG proponents.



Figure 9.3—Fatality Risk Contours



Other safety assessments were conducted according to international standard *NFPA59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)*. This standard has requirements to estimate potential hazards covering the accidental release and ignition of LNG. Specific consequence analyses were conducted during the EIS and reviewed in subsequent supplementary material for the revised plant layout for the following scenarios:

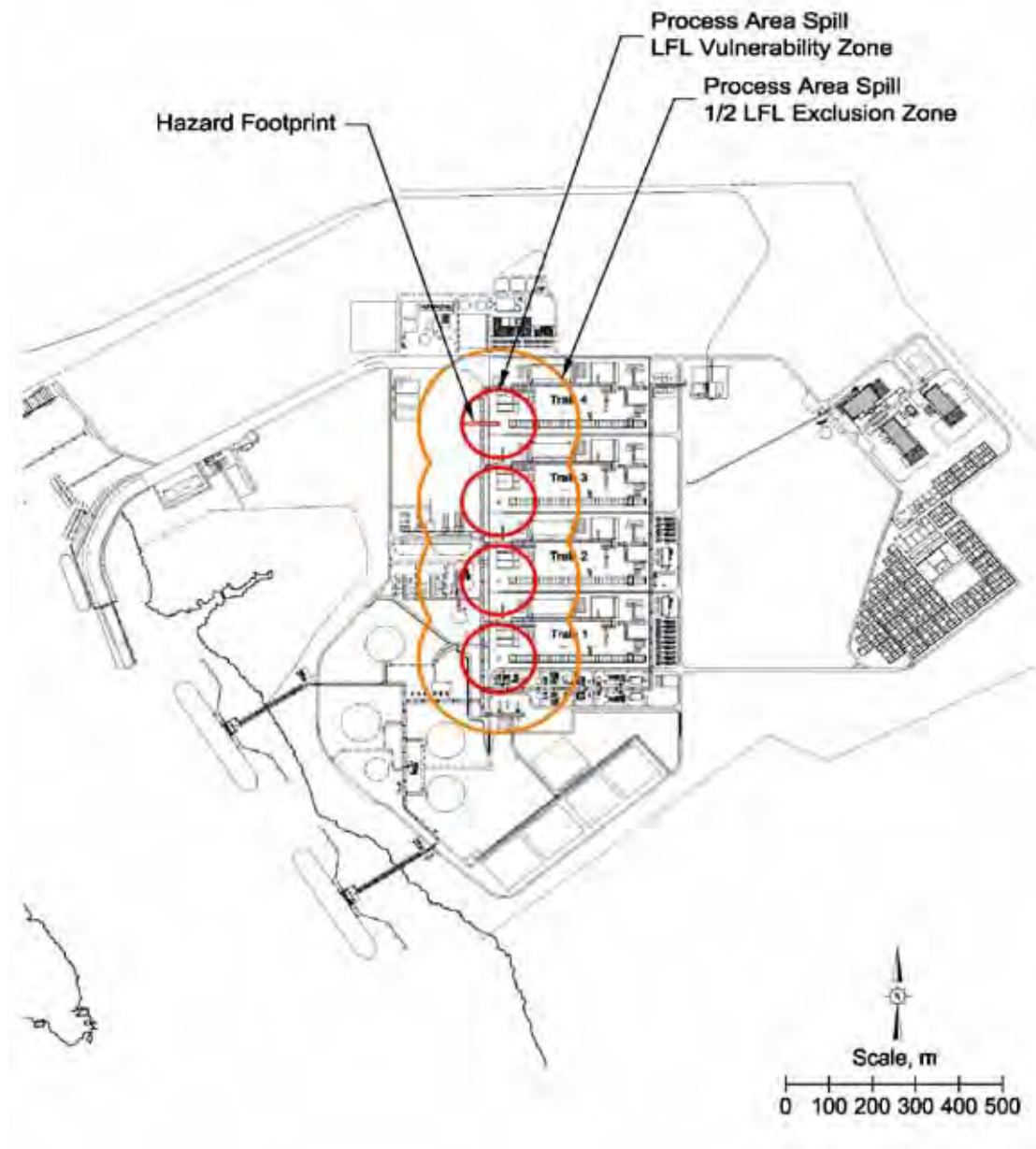
- spills of flammable liquids (vapour cloud)—Figure 9.4
- thermal radiation (pool fires)—Figure 9.5
- vapour cloud explosion overpressures—Figure 9.6

While these assessments are complex, and consider many scenarios in a number of critical locations in the plant, the reason the EIS evaluated these elements was to identify “vulnerability zones” which indicate where an effect from the hazard will be felt when and if it occurs. While this does not include the probability, it does set out where a person is “vulnerable” to that hazard.



The acceptance criteria for vulnerability in residential areas are taken from HIPAP 10. For overpressures, the level of 7kPa is specified (at which probability of injury is 10 per cent), and for thermal radiation, 4.7kW/m² (at which injury is experienced after 30 secs exposure). For vapour clouds, the Coordinator-General has referred to NFPA 59A *Standards for the Production, Storage and Handling of LNG*, and has set a criteria that the LNG storage tanks are to be sited so that the half lower flammability limit (1/2 LFL) from a vapour cloud escape does not reach the site boundary.

Figure 9.4—Design Spill Flammable Dispersion Vulnerability Zones (1/2 LFL) and LFL Vulnerability Zones



The 1/2 LFL of a vapour cloud is 50 per cent below the lower concentration at which the cloud can ignite



Figure 9.5—Fire Radiation Vulnerability Zones for Impoundment Fires





Figure 9.6—Composite Explosion Overpressure Vulnerability Zones

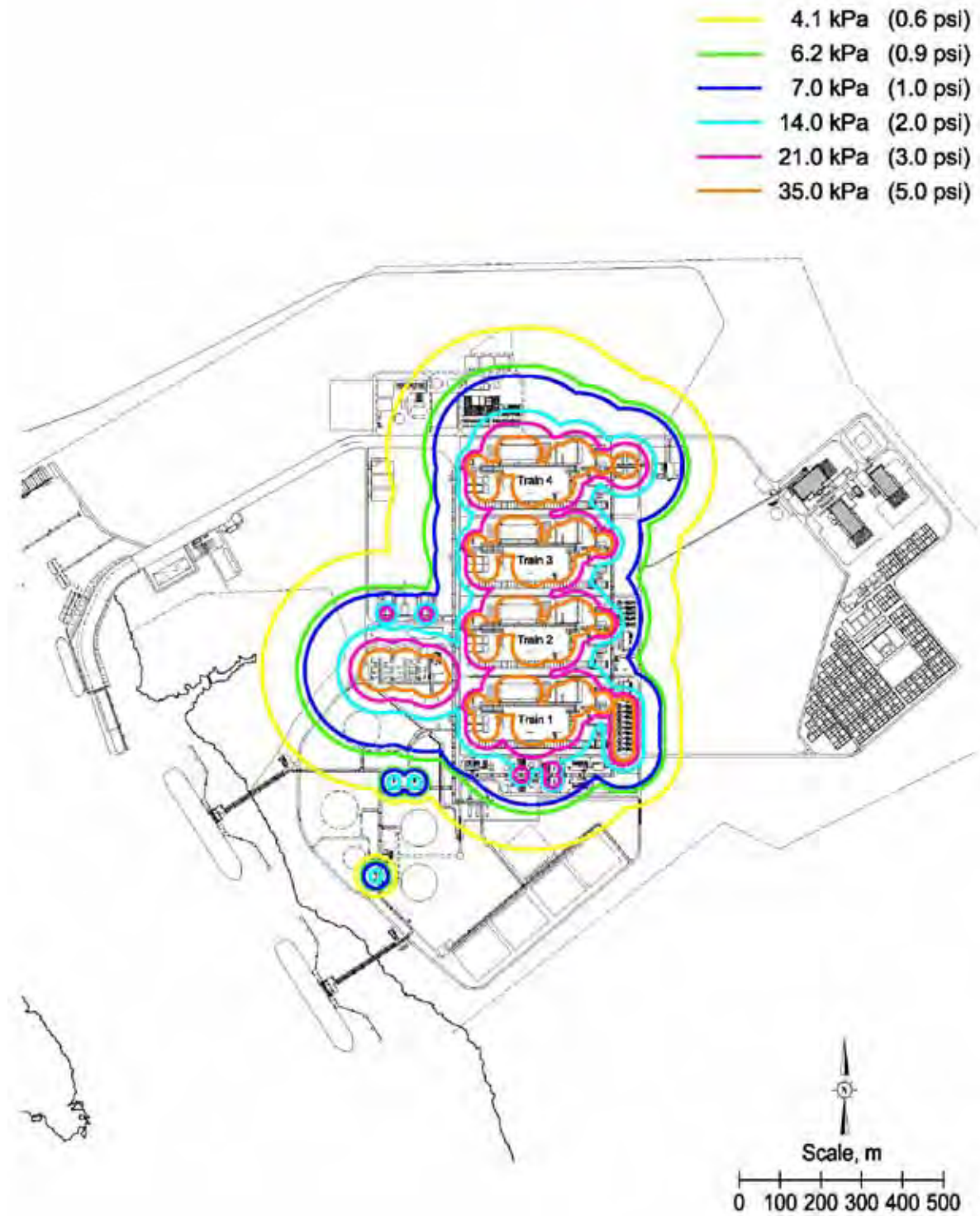


Figure 9.4, Figure 9.5 and Figure 9.6 indicate that the ½ LFL, heat flux and overpressure are confined within the site boundary. Further, the proposed location of the APLNG temporary workers accommodation at the north of the site lies well outside the acceptability criteria for vulnerability for each hazard scenario examined as does the QGC proposed TWAF on the adjacent site.



Coordinator-General's conclusion

In considering the hazard and risk assessment of the LNG facility, the Coordinator-General notes that the study done in the EIS and in the supplementary material is of a preliminary hazard analysis and risk assessment as recognised by the Australian Standard. It is accepted 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.

After consulting with the Hazardous Industries and Chemical Branch, they have advised that they will require the project to demonstrate by a Systematic Risk Assessment that the project risks are confined within the site boundaries. A condition is therefore imposed in Appendix 4, Part 2, Condition 1, to require the proponent to undertake this assessment.

The Coordinator-General accepts that the risk assessment in the EIS and supplementary material 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, the Coordinator-General is of the opinion that the residential safety criteria are satisfied at adjacent sites. The criteria nominated to achieve this, which must be satisfied in the above Systematic Risk Assessment, appear at Appendix 4, Part 2, Condition 2.

The Coordinator-General is aware the proponent is proposing to locate a construction accommodation facility (TWAF) on the plant site.

Other sections of this report 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.

Therefore, Appendix 4, Part 2, Condition 2 specifies that the residential safety criteria be met at the boundary of the TWAF, which are further defined to include a buffer of 50 metres around the TWAF as an extra precaution.

It is intended to apply these overlapping conditions to all LNG projects on Curtis Island and in so doing, the Coordinator-General believes that hazard and risk criteria will be confined to each site, and also there will be no risk criteria interaction between sites. It is recommended 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, the Coordinator-General is 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, it is noted that for ships loading with LNG, the principal hazard is a vapour cloud from a major leak from the loading system. Having regard to the vapour dispersion consequence analysis undertaken, 250 metres should be the exclusion distance around the loading of LNG vessels, when LNG transfer is taking place and for 30 minutes after loading, a 250-metre exclusion zone around LNG ship loading manifold has been set in agreements with the Gladstone Ports Corporation.



Conditions 1 and 2, Appendix 4, Part 2 are provided, 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, these conditions 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.

9.7. Development timing of future LNG trains

APLNG is seeking approval for the ultimate development of its project. In regard to the LNG facility component, ultimate development involves four trains producing a total of 18 Mtpa of LNG. Trains 1 and 2 are scheduled for construction in 2014/2015 and construction of trains 3 and 4 at a future date subject to market conditions and gas field development. Indications from APLNG are that trains 3 and 4 could come online around 2017/2018.

In the ordinary course of events, the currency of this report will lapse four years after it is released unless it is extended pursuant to section 35A of the SDPWO Act. In the absence of an extension, the report will lapse in 2014 and to the extent that material change of use approvals for subsequent train/s have not been sought, a new application for significant project environmental assessment under the SDPWO Act will be required to cover the subsequent train/s.

To assist in dealing with this issue, provided that APLNG informs the Coordinator-General that it wishes to proceed with construction of a subsequent train/s before the end of four years after this report, the currency of this report may be extended for a further two-year period to enable construction of subsequent train/s to commence within that two-year period. Appendix 4, Part 2, Condition 6 reflects this decision.



10. Matters of national environmental significance

On 3 August 2009, the three elements of the project (gas fields, pipeline, LNG facility) were each formally determined to be controlled actions requiring assessment and approval by the Commonwealth Minister for the Environment, Heritage and the Arts. The relevant controlling provisions under the EPBC Act were variously determined as being:

- World Heritage (sections 12 and 15A)
- National Heritage Places (sections 15B and 15C)
- Wetlands (Ramsar) (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A).

The world heritage and national heritage places controlling provisions are applicable to the gas pipeline and the LNG facility, but not the gas fields. The wetlands controlling provision applies only to the gas fields.

This section of the report provides an evaluation of the potential impacts of the project on MNES. Volume 2, Chapter 23; Volume 3, Chapter 23; and Volume 4, Chapter 23 of the EIS addressed MNES for the three components of the APLNG project. In addition, Volume 1, Chapter 6 (sections 6.1.21, 6.2.21 and 6.3.21) provided APLNG commitments in regards to MNES.

10.1. Gas fields

EPBC referral EPBC 2009/4974 was lodged to address the controlled actions requiring assessment for the APLNG gas fields. The controlling provisions applicable to the gas fields are:

- wetlands (Ramsar) (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

The methodology used to assess the potential MNES impacts relating to the gas fields involved:

- desktop reviews of relevant literature and existing data
- desktop research including utilisation of EPBC Protected Matters search, Qld Herbarium HERBRECS Flora Collection records, DERM Wildlife Online databases, Birds Australia database, and Queensland Museum Fauna Collection records
- desktop mapping including utilisation of DERM Regional Ecosystem RE mapping, DERM Regulated Growth Vegetation mapping, DERM RE description database, DERM Essential Habitat mapping, Queensland Wetland and Environmentally Sensitive Area mapping, and Directory of Important Wetlands database
- field surveys and sampling.

The EIS provides a description of the existing environment and values relevant to the controlling provisions as applicable to the gas fields (s23.3).

10.1.1. Listed threatened species and communities

Threatened ecological communities

The EIS identified three ecological communities listed under the EPBC Act as endangered, present in the gas field study area:

- Brigalow
- Semi-Evergreen Vine Thicket
- Weeping Myall Open Woodland.



An additional three communities were recorded when using the EPBC Act protected matters search tool:

- natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland
- community of native species dependent on natural discharge of groundwater from the Great Artesian Basin
- white box-yellow box-Blakely's red gum grassy woodland and derived native grassland.

Although these communities were recorded with the protected matters search tool, the EIS claimed that these three additional communities are not confirmed to be present nor considered likely in the gas fields study area.

The REs analogous to the three endangered ecological communities and their extents in the gas fields study area are summarised in Table 10.1.

Table 10.1—EPBC Act endangered regional ecosystems within the gas fields study area

Regional ecosystem	EPBC Act status	Current study area extent (ha)	Extent to be cleared (ha)	% of relevant provinces to be cleared	% of study area to be cleared
11.3.1	Endangered	792	4.51	0.15	0.57
11.3.2	Endangered [^]	14,729	129.13	0.08	0.88
11.4.3	Endangered	4,759	18.86	0.06	0.40
11.4.7	Endangered	292	0.43	0.01	0.15
11.4.10	Endangered	64	0.90	0.06	1.40
11.8.3	Endangered	8	0	0	0
11.9.1	Endangered	7	0	0	0
11.9.4	Endangered	3,605	13.27	0.12	0.37
11.9.5	Endangered	10,897	45.21	0.06	0.41
11.9.6	Endangered	118	0	0	0
Total extent to be cleared (ha)*			83.18		

[^] Only where weeping Myall (*Acacia pendula*) occurs

* Not including RE 11.3.2

The EIS estimates 83 ha of endangered RE (excluding RE 11.3.2 which is endangered only when Weeping Myall is present) will be cleared as a result of the gas fields. This equates to less than 0.15 per cent of the provincial extent of any of the communities. These areas are generally those isolated from adjoining vegetation and/or occurring adjacent to currently disturbed vegetation and/or cleared areas.

Terrestrial ecology sensitivity mapping has been used as a method for gas field disturbance rationalisation and location choice using RE mapping as the basis (section 23.3.1). The EIS concluded that the most sensitive areas are associated with remnant Brigalow communities and highly sensitive remnant vegetation occurring within Bioregional corridors.

The EIS includes an assessment of the proposed clearing for the gas fields against the significant impact criteria for the threatened ecological communities (section 23.4). The result determined there are no significant impacts predicted for threatened ecological communities. Although not assessed as significant, the EIS recognises that potential impacts of the gas fields on threatened terrestrial communities are likely to be primarily associated with habitat loss, degradation, fragmentation, isolation and loss of connectivity due to the physical clearing of vegetation. Mitigation and management measures are designed to limit these impacts on MNES.

Section 7.5 of this report discusses potential impacts of groundwater drawdown on springs and associated groundwater-dependent ecosystems. APLNG advised that there is only one recognised spring within APLNG's gas fields' tenements and that field investigations could not identify any evidence of groundwater dependent vegetation at the site. A preliminary conservative assessment of river reaches where potential groundwater baseflow could occur within the gas fields' tenements has also been undertaken although this will be refined using field studies and remote sensing.



There are a number of springs on the register located in the Surat North and Surat Management Areas. The register maintains a list of springs for the purpose of implementation of the Water Resource (Great Artesian Basin) Plan 2006. The proponent considers it very unlikely any discharge springs occur within the area of potential drawdown from their CSG activities and that the closest registered discharge springs are at the Eulo springs complex, which is located approximately 500km southwest of the gas fields.

Threatened terrestrial flora and fauna

The EIS identified 16 terrestrial flora species listed as threatened under the EPBC Act, known to be present or potentially present within the gas fields study area (section 23.5.1). Of these 16 flora species, three are listed as 'endangered':

- Herbaceous xerothermella (*Xerothermella herbacea*)
- Slender tylophora (*Tylophora linearis*)
- Microcarpaea (*Microcarpaea agonis*).

The remaining 13 are listed as 'vulnerable' under the EPBC Act. Five of the species were recorded during field surveys:

- Chinchilla wattle (*Acacia chinchillensis*)
- Thomby Range wattle (*Acacia wardellii*)
- Gurulmundi fringe myrtle (*Calytrix gurulmundensis*)
- Belson's panic grass (*Homopholis belsonii*)
- Ooline (*Cadellia pentastylis*).

The remaining eleven have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the gas fields area.

The EIS identified 14 terrestrial fauna species listed as threatened under the EPBC Act, known to occur or possibly occur within the gas fields study area (section 23.5.2). Of these 14 fauna species, the EIS recognised two undescribed species of land snail as being known to occur within the gas fields:

- Brigalow Woodland Snail (Camaenidae BL13)
- Dulacca Woodland Snail (Camaenidae BL12).

Both these species are being assessed by the Commonwealth government for listing under the EPBC Act as 'critically endangered' and 'endangered' respectively. In addition to these two species, the Swift parrot (*Lathamus discolor*) is listed as 'endangered' and occurring or possibly occurring within the gas fields. The remaining eleven terrestrial fauna species are listed as 'vulnerable' under the EPBC Act.

Four of the species were recorded during field surveys:

- Brigalow scaly-foot (*Paradelma orientalis*)
- Squatter pigeon (*Geophaps scripta*)
- Dulacca woodland snail
- Brigalow woodland snail.

The remaining ten species have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the gas fields area.

The EIS includes an assessment of the proposed impact of the gas fields against the significant impact criteria for the threatened terrestrial flora and fauna (section 23.5.2). The result determined there are no significant impacts predicted for threatened terrestrial flora and fauna species. Although not assessed as significant, the EIS recognises that potential impacts of the gas fields on terrestrial flora and fauna are likely to be primarily associated with habitat loss, degradation, fragmentation, and loss of connectivity due to the physical clearing of vegetation. Mitigation and management measures are designed to limit these impacts on MNES.

Threatened aquatic fauna

The EIS identified one aquatic fauna species listed as threatened under the EPBC Act, the Murray Cod, as known to be present or predicted to occur within the gas fields study area in the Condamine and



Balonne Rivers and their tributaries (section 23.5.3). An aquatic ecology, water quality and geomorphology assessment was undertaken in order to assess the potential impacts of the gas fields area on the Murray Cod (EIS Volume 5, Attachment 14). The assessment concluded that there is a low risk of impact to Murray Cod during construction and/or operation of the gas fields.

The EIS includes an assessment of the proposed impact of the gas fields against the significant impact criteria for the threatened aquatic fauna species (section 23.5.3). The result determined there are no significant impacts predicted for the threatened aquatic fauna species. Although not assessed as significant, the EIS recognises that potential impacts of the gas fields on the Murray Cod could be associated with increased sediment delivery to waterways during construction, damming of perennial watercourses during crossing construction, and increased baseflows. These impacts are considered temporary and mitigation and management measures are designed to limit these impacts on MNES.

Section 7.4.3 of this report outlines the proponent's proposed CSG water management strategy which includes a range of beneficial use options such as discharge to surface waters, irrigation and aquifer injection. The release of large volumes of water into an intermittent river such as the Condamine River would need to consider all ecological constraints including EPBC-listed threatened species. The proposed management regime would consist of 'pulsed' discharges of treated water so as to reflect the natural hydrological regime of the receiving waters. The EIS did not identify any ecological constraints that might arise from a proposed pulsed discharge regime that mirrored natural flow variability in the Condamine River.

10.1.2. Listed migratory species

Listed migratory birds

The EIS identified 28 birds listed as migratory under the EPBC Act known to occur or possibly occur within the gas fields study area (section 23.6.1 and Volume 5, Attachment 14). Two of the species were recorded during field surveys:

- Eastern great egret (*Fregata ariel*)
- White-bellied sea-eagle (*Haliaeetus leucogaster*).

The remaining 26 species have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the gas fields area.

Twenty of the 28 birds identified are strongly associated with water bodies which are not a significant feature of the study area. In addition, the EIS suggests that any existing resources present within the study area would be used infrequently and on a transitory basis.

The EIS includes an assessment of the proposed impact of the gas fields against the significant impact criteria for the migratory birds (section 23.6.1). The result determined there are no significant impacts predicted for the migratory birds.

10.1.3. Wetlands

Ramsar wetlands

The EIS identified the Narran Lakes Nature Reserve located approximately 500 km downstream of the proposed discharge locations in central northern NSW, to be the closest Ramsar listed wetland to the gas fields (section 23.7).

The EIS includes an assessment of the proposed impact of the gas fields against the significant impact criteria for Ramsar wetlands (section 23.7.1). The result determined there are no significant impacts predicted for the Ramsar wetland.



10.1.4. Mitigation and management—gas fields

APLNG propose a number of mitigation and management strategies for the impacts of the proposed gas field on MNES (section 23.12). These include:

- ongoing environmental planning through over-arching field development plans
- detailed field planning and internal approval processes
- terrestrial ecology habitat management guidelines
- where threatened ecological communities can not be avoided and clearing is required, they will be offset as a matter of preference within bioregional corridors
- works within 200m of threatened ecological communities will be subject to habitat management guidelines
- predevelopment surveys will be undertaken
- works within 200m of known populations of threatened flora and fauna will be subject to specific threatened species management guidelines
- sensitive infrastructure siting
- where threatened species can not be avoided and management can not adequately mitigate impacts, permits will be obtained that will provide conditions for the disturbance of threatened species
- where threatened species can not be avoided translocation plans will be prepared where suitable or offset measures proposed
- any water discharge to the environment will be suitably treated before release and mixed with natural flows
- utilising sensitivity mapping and landscape management guidelines to plan the location of infrastructure
- limit clearing in areas of high biodiversity value, particularly in Category 1 and 2 areas
- establish a vegetation offset program approved by DERM and the Commonwealth Government for compensation of impacts that can not be adequately reduced through avoidance or mitigation
- APLNG will engage with government and community to develop sustainable regional land use strategies
- implement weed management measures
- develop and implement water quality, aquatic ecology and geomorphology monitoring programs for treated water discharge
- locate discharge points within geomorphologically stable reaches of watercourses
- design and implement erosion and sediment control devices according to regulatory requirements
- design discharges to watercourses to mimic natural flows
- design watercourse crossings so flows and aquatic fauna passage are not impeded.

10.1.5. Coordinator-General's conclusion—gas fields

An assessment of the impacts on each MNES present or likely to be present within the gas fields has been undertaken in the EIS. The assessment concludes that no action related to the gas fields will have a significant impact on the elements subject to the relevant controlling provisions on the basis that the proposed mitigation and offset measures are fully implemented.

The Coordinator-General concurs with the EIS assessment of the proposed clearing for the gas fields and other works against the significant impact criteria for EPBC-listed threatened species and ecological communities to be that no significant impacts are predicted. There is a requirement (Appendix 2, Part 2, Condition 1) that the gas field development planning will recognise and avoid, where practical, environmentally sensitive areas and threatened species therefore minimising impacts on EPBC-listed threatened species and ecological communities. A condition is imposed (Appendix 1, Part 1, Condition 7) that requires a Significant Species Management Plan to be prepared for all threatened species potentially impacted by the project. Where clearing of sensitive vegetation and habitat cannot be avoided, a condition is imposed (Appendix 1, Part 1, Condition 5) to ensure appropriate offsets are implemented to ensure the overall extent of affected ecological communities is maintained or enhanced.

In regard to the proposed release of treated CSG water to surface waterways, the proposed management regime, to consist of 'pulsed' discharges of treated water so as to reflect the natural



hydrological regime of the receiving waters, is supported. Conditions are imposed (including Appendix 2, Part 2, Conditions 4 and 7) to ensure consideration of potential ecological impacts (including the effects of cumulative discharges) on aquatic habitat including native fish breeding and feeding areas, potential for erosion and disturbance of riverine vegetation.

The Coordinator-General accepts the proponent's advice that it considers it very unlikely any discharge springs occur in the area of potential drawdown from their CSG activities, although it is found that the full extent of actual impacts requires further investigation. Section 7.5.3 of this report discusses the need to monitor all aquifers likely to be affected as an essential part of an adaptive Environmental Management Plan for the CSG field. Relevant conditions are imposed (Appendix 2, Part 2, Conditions 10 and 11) to ensure that adaptive, rather than reactive, management will be achieved. It is noted the proposed regulatory framework under the *Water Act 2000* provides for a risk-based adaptive management approach to spring impact management. This will require that proponents will have an obligation to undertake an assessment of all springs within an area of likely to have a 0.2-metre drawdown and accordingly implement any required mitigation measures.

The EIS assessed the proposed impact of the gas fields against the significant impact criteria for the migratory birds, and concluded that that no significant impacts are predicted. The Coordinator-General concurs with this finding and is satisfied that the gas field development would not affect important habitat for migratory species given the nature of the resources in the area. The constraints planning for the gas field development (Appendix 2, Part 2, Condition 1) will recognise and avoid, where practical, environmentally sensitive areas including key wildlife habitat, therefore minimising potential impacts on EPBC-listed migratory species. A condition is imposed (Appendix 1, Part 1, Condition 5) to ensure offsets are provided where necessary to ensure appropriate management of affected EPBC-listed migratory species.

The EIS assessed the proposed impact of the gas fields against the significant impact criteria for Ramsar wetlands, concluding that no significant impacts are predicted given the substantial geographical and hydrological separation (approximately 500 km). The Coordinator-General concurs with this assessment.

The Coordinator-General notes the potential cumulative impacts of the development of various CSG/LNG proposals in the vicinity of the APLNG gas fields. A condition is imposed (Appendix 1, Part 1, Condition 13) to ensure that sufficient information is available to the CSG Industry Monitoring Group to understand and respond to the social and environmental cumulative impacts of the combined CSG and other industries in the region.

As outlined in Volume 1 Chapter 6 (section 6.1.21) of the EIS, APLNG has proposed a number of commitments in relation to MNES for the proposed gas fields. The Coordinator-General supports the adoption of these commitments in the EM Plan.

10.2. Pipeline

EPBC referral EPBC 2009/4976 was lodged to address the controlled actions requiring assessment for the APLNG gas pipeline. The controlling provisions applicable to the pipeline are:

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

The methodology used to assess the potential MNES impacts relating to the pipeline involved:

- desktop reviews of relevant literature and existing data
- desktop research including utilisation of EPBC Protected Matters search, Qld Herbarium HERBRECS Flora Collection records, DERM Wildlife Online databases, Birds Australia database, and Queensland Museum Fauna Collection records
- desktop mapping including utilisation of DERM Regional Ecosystem RE mapping, DERM Regulated Growth Vegetation mapping, DERM RE description database, DERM Essential Habitat mapping, Queensland Wetland and Environmentally Sensitive Area mapping, and Directory of Important Wetlands database



- field surveys and sampling.

The EIS provides a description of the existing environment and values relevant to the controlling provisions as applicable to the pipeline (section 23.9).

10.2.1. Listed threatened species and communities

Threatened ecological communities

The EIS identified (section 23.10.1) three ecological communities listed under the EPBC Act as 'endangered', present in the pipeline ROW:

- Brigalow
- Semi-Evergreen Vine Thicket
- Weeping Myall Open Woodland.

The REs analogous to the three threatened ecological communities and their extents in the pipeline ROW are summarised in Table 10.2.

Table 10.2—EPBC Act endangered regional ecosystems within the pipeline ROW

Regional ecosystem	EPBC Act status	Current extent within 5km of ROW (ha)	Extent to be cleared in ROW (ha)
11.9.5	Endangered	1926	1.5
11.3.2	Endangered [^]	884.5	0.4
11.11.18	Endangered	596.3	0.2
11.12.21	Endangered	541	0.1
11.9.6	Endangered	76.4	0.1
11.9.1	Endangered	194.2	0.1
Total extent to be cleared (ha)*			2.0

[^] Only where weeping Myall (*Acacia pendula*) occurs

* Not including RE 11.3.2

The EIS estimates 2ha of endangered RE (excluding RE 11.3.2 which is endangered only when Weeping Myall is present) will be cleared as a result of the pipeline (Table 23.2). RE11.3.2 is excluded from this, due to no areas containing Weeping Myall woodlands being observed within the pipeline route.

The EIS includes an assessment of the proposed clearing for the pipeline ROW against the significant impact criteria for the threatened ecological communities (section 23.10.1). The result determined there are no significant impacts predicted for threatened ecological communities. Although not assessed as significant, the EIS recognises that potential impacts of the pipeline on threatened terrestrial communities are likely to be primarily associated with introducing and/or spreading weeds and pests, leaching pollutants, releasing sediment, edge effects and fragmentation due to the physical clearing of vegetation. Mitigation and management measures are designed to limit these impacts on MNES.

Wetlands of national importance

The EIS identifies that the only wetlands of national importance known to occur in the vicinity of the pipeline corridor are the communities of native species depend on natural discharge of groundwater from the Great Artesian Basin (GAB) (section 23.10.1). The pipeline is located within the GAB supergroup known as the Springsure Supergroup, Brigalow Belt Complex. The community of native species dependent on the GAB springs is listed as an endangered community under the EPBC Act.

The closest mapped springs to the pipeline are located 1.7km west of the Cockatoo Creek crossing. These springs are recharge springs rather than discharge springs and therefore not an EPBC-listed threatened ecological community. However, in recognition of the ecological value of these recharge springs, the EIS includes an assessment of the pipeline against the significant impact criteria (section 23.10.1). The result determined there are no significant impacts predicted for the recharge spring communities.



Wetlands of international importance

The EIS identifies that no wetlands of international importance are present within the vicinity of the pipeline corridor (section 23.12). Similarly, no Ramsar wetlands are present.

Threatened terrestrial flora and fauna

The EIS identified 33 terrestrial flora species listed as threatened under the EPBC Act, known to be present or potentially present within the pipeline ROW (section 23.10.2). Of these 33 flora species, five are listed as 'endangered':

- Large-fruited zamia palm (*Cycas megacarpa*)
- Yarwun whitewood (*Atalaya collina*)
- Slender tylophora (*Tylophora linearis*)
- Finger panic grass (*Digitaria porrecia*)
- Salt pipewort (*Eriocaulon carsonii*).

The remaining 28 flora species are listed as 'vulnerable' under the EPBC Act. Two of the species were recorded during field surveys (Large-fruited zamia palm and Ooline) and an additional 21 of the species have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the pipeline ROW (Table 23.3).

The EIS identified 16 terrestrial fauna species listed as threatened under the EPBC Act, known to occur or possibly occur within the pipeline ROW (section 23.10.3). Of these 16 fauna species, two are listed as 'endangered':

- Northern quoll (*Dasyurus hallucatus*)
- Semon's leaf-nosed bat (*Hipposideros semoni*).

The remaining 14 species are listed as 'vulnerable' under the EPBC Act. Only one of the species was recorded during field surveys (Squatter pigeon) and the other 15 of the species identified have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the pipeline ROW (Table 23.4).

The EIS includes an assessment of the proposed impact of the pipeline against the significant impact criteria for the threatened terrestrial flora and fauna (sections 23.10.2 and 23.10.3). The result determined there are no significant impacts predicted for threatened terrestrial flora and fauna species. Although not assessed as significant, the EIS recognises that potential impacts of the pipeline on terrestrial flora and fauna are likely to be primarily associated with habitat loss, degradation, fragmentation, loss of connectivity, the introduction and/or spread of invasive weeds or pests, leaching of pollutants or release of sediment, and dust emissions due to the physical clearing of vegetation. Mitigation and management measures are designed to limit these impacts on MNES.

Threatened aquatic fauna

The EIS identified one aquatic fauna species listed as threatened under the EPBC Act, the Murray Cod, as known to be present or predicted to occur within the pipeline area in the Condamine and Balonne Rivers and their tributaries (section 23.10.4). An aquatic ecology, water quality and geomorphology assessment was undertaken in order to assess the potential impacts of the pipeline on the Murray Cod (EIS Volume 5, Attachment 14). The assessment concluded that there is a low risk of impact to Murray Cod during construction and/or operation of the pipeline.

The EIS includes an assessment of the proposed impact of the pipeline against the significant impact criteria for the threatened aquatic fauna species (section 23.10.4). The result determined there are no significant impacts predicted for the threatened aquatic fauna species. Although not assessed as significant, the EIS recognises that potential impact of the pipeline on the Murray Cod could be associated with increased sediment delivery to waterways during construction. This impact is considered temporary and mitigation and management measures are designed to limit these impacts on MNES.

Threatened marine fauna

The EIS identifies two marine fauna species which are not also migratory species (section 23.10.5):



- Green sawfish (*Pristis zijsron*)
- Whale shark (*Rhincodon typus*).

Neither of these threatened marine fauna species are considered likely to occur in the pipeline crossing area therefore are not assessed any further.

10.2.2. Listed migratory species

Listed migratory birds

The EIS identified 46 birds listed as migratory under the EPBC Act predicted to occur within the pipeline area (section 23.11.1). Eight of the species were recorded during field surveys and 33 of the species have either been recorded previously or are considered possible occurrences based on the presence of suitable habitat within the pipeline ROW (Table 23.5). Of the 46 migratory birds predicted to occur within the pipeline area, eight were identified during field surveys:

- Eastern reef egret (*Egretta sacra*)
- White-bellied sea eagle (*Haliaeetus leucogaster*)
- Pacific golden plover (*Pluvialis fulva*)
- Whimbrel (*Numenius phaeopus*)
- Eastern curlew (*Numenius madagascariensis*)
- Rainbow bee-eater (*Merops ornatus*)
- Rufous fantail (*Rhipidura rufifrons*)
- Satin flycatcher (*Myiagra cyanoleuca*).

An additional 33 migratory species are considered likely to occur based on habitat preference.

The majority of the migratory birds identified are strongly associated with water bodies, either coastal and/or freshwater. The pipeline alignment has been selected to avoid major water bodies, reducing the likelihood of impact on these species. However, two wetland areas, Port Curtis and The Narrows, will be transected by the pipeline. There is potential for the Port Curtis and The Narrows wetlands to be classified as important habitat for migratory shorebirds. It is predicted that there will be a loss of 11.9 ha of saltpan and saltmarsh and 3.3 ha of mangroves as a result of the pipeline. The EIS notes that there should be no degradation of any adjacent habitat providing management guidelines are implemented (section 23.11.1). The EIS states that the impacts will be limited to the construction period and once operational, the pipeline should cause minimal disturbance if any to migratory shorebirds and waterbirds.

The EIS includes an assessment of the proposed impact of the pipeline against the significant impact criteria for the migratory birds (section 23.11.1). The result determined there are potential significant impacts predicted for migratory birds on a temporary basis during the construction period. No significant impacts are predicted for migratory birds.

Threatened marine fauna

The EIS identified up to twenty marine fauna species (excluding birds) listed as migratory under the EPBC Act predicted to occur within or adjacent to the pipeline area (section 23.11.3). Of these twenty, nine marine fauna species are considered likely to utilise the marine area adjacent to the pipeline area. Four are listed as 'critically endangered':

- Dugong (*Dugong dugon*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- Bottlenose dolphin (*Tursiops truncatus*)
- Australian snubfin dolphin (*Orcaella heinsohni*).

Two are listed as 'endangered':

- Loggerhead turtle (*Caretta caretta*)
- Olive Ridley turtle (*Lepidochelys olivacea*).

The remaining three species are listed as 'vulnerable' under the EPBC Act:

- Flatback turtle (*Natator depressus*)



- Green turtle (*Chelonia mydas*)
- Hawksbill turtle (*Eretmochelys imbricata*).

The EIS includes an assessment of the proposed impact of the pipeline against the significant impact criteria for the threatened migratory marine fauna species (section 23.11.3). The result determined there are no significant impacts predicted for the threatened marine fauna species. Although not assessed as significant, the EIS recognises that potential impact of the pipeline migratory marine fauna could be associated with disturbance and fragmentation of mangrove and saltmarsh/saltpan habitat, underwater noise, disturbance of sub-tidal habitat and turbidity plumes. These impacts are considered temporary and mitigation and management measures are designed to limit these impacts on MNES.

10.2.3. World heritage and national heritage places

The EIS identified one World Heritage site within or adjacent to the pipeline area—the Great Barrier Reef (section 23.13.1). At the coast, the proposed pipeline is located within Gladstone Port limits. Below the mean low water mark, the marine environment is considered located within the Great Barrier Reef World Heritage Area. The Great Barrier Reef was placed on the National Heritage List due to its World Heritage listing. The EIS states that no other heritage sites of national or state significance occur along the pipeline route. The EIS states that impacts will be limited to the construction period and once operational, the pipeline have no impacts on the world heritage and national heritage values of the Great Barrier Reef World Heritage Area.

The Great Barrier Reef Marine Park does not occupy the same spatial extent as the Great Barrier Reef World Heritage Area, and is recognised as a separate MNES. The pipeline does not extend into any area of the Great Barrier Reef Marine Park, therefore the pipeline is not likely to have a significant impact on its environment.

The EIS includes an assessment of the proposed impact of the pipeline against world heritage and national heritage values (section 23.13.1). The potential impacts to the world heritage values of the Great Barrier Reef as a result of the construction of the proposed pipeline include:

- outstanding example representing a major stage of the earth's evolutionary history
- outstanding example representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment
- contain unique, rare and superlative natural phenomena, formations and features and areas of exceptional natural beauty
- provide habitats where populations of rare and endangered species of plants and animals still survive.

The result of the assessment determined the impacts on world heritage and national heritage values predicted as a result of the proposed pipeline to be not of significance or negligible (section 23.13.1). Impacts will be associated with construction rather than operation of the pipeline. These impacts are considered temporary and mitigation and management measures are designed to limit these impacts on MNES.

10.2.4. Mitigation and management—pipeline

APLNG propose a number of mitigation and management strategies for the impacts of the proposed pipeline on MNES (section 23.18). These include:

- in order to finalise the pipeline alignment, conduct surveys for *Cycas megacarpa* along the Callide Range and Calliope Range
- undertake a population mapping exercise for *Acacia pedleyi* along the Callide Range
- limit vegetation clearing to the minimum possible extent and utilise existing tracks and cleared areas
- develop and implement a weed and pest biosecurity management plan during construction and operation
- establish a vegetation offset program approved by DERM and the Commonwealth government for compensation of impacts that can not be adequately reduced through avoidance or mitigation
- design and implement erosion and sediment control devices according to regulatory requirements
- design watercourse crossings so flows and aquatic fauna passage are not impeded



- undertake pre-clearing surveys to identify the presence of threatened flora and fauna species where they are likely to occur. Where they occur, realign the pipeline to avoid them where safe to do so
- develop a construction methodology that will minimise disturbance
- work with State government, Gladstone Ports Corporation and other proponents to achieve an outcome that minimises cumulative impacts
- establish a process for visual observations and recording of dugongs and cetaceans
- if dredging is the adopted construction method, all activities will be undertaken in accordance with dredge management procedures.

10.2.5. Coordinator-General's conclusion—pipeline

An assessment of the impacts on each MNES present or likely to be present within the pipeline ROW has been undertaken in the EIS. The assessment concludes that no action related to the pipeline will have a significant impact on the elements subject to the relevant controlling provisions on the basis that the proposed mitigation and offset measures are fully implemented.

The EIS assessed the proposed clearing for the pipeline ROW and other works against the significant impact criteria for EPBC-listed threatened species and ecological communities and concluded that no significant impacts are predicted. The Coordinator-General concurs with this assessment. Condition 1 in Appendix 2, Part 3 specifies detailed impact assessment, avoidance and site rehabilitation measures to be included in the environmental management plan for the gas transmission pipeline. In addition, a condition is imposed (Appendix 1, Part 1, Condition 7) that requires a Significant Species Management Plan to be prepared for all threatened species potentially impacted by the project. Where clearing of sensitive vegetation and habitat cannot be avoided, a condition is imposed (Appendix 1, Part 1, Condition 5) to ensure appropriate offsets are implemented to ensure the overall extent of affected ecological communities is maintained or enhanced.

The EIS assessed the proposed pipeline against the significant impact criteria for the spring communities and concluded that there are no significant impacts predicted, given that the spring communities identified in the vicinity of the pipeline are recharge as opposed to discharge springs. The Coordinator-General concurs with this assessment.

The Coordinator-General concurs with the EIS that no wetlands of international importance are present within the vicinity of the pipeline corridor and no Ramsar wetlands are present.

The EIS assessed the proposed impact of the pipeline against the significant impact criteria for migratory birds and concluded that there are potential significant impacts predicted on a temporary basis during the construction period; however, no significant long-term impacts are predicted for the operational period. The Coordinator-General concurs with this assessment. A condition is imposed (Appendix 1, Part 1, Condition 7) that requires a Significant Species Management Plan to be prepared for all listed migratory species potentially impacted by the project. Where clearing of sensitive vegetation and habitat cannot be avoided, a condition is imposed (Appendix 1, Part 1, Condition 5) to ensure appropriate offsets are implemented to ensure the overall extent of affected migratory species habitat is maintained or enhanced.

The EIS assessed the proposed impact of the pipeline against the significant impact criteria for the threatened migratory marine fauna species and concluded that there are no significant impacts predicted. The Coordinator-General concurs with this conclusion and, in particular, is satisfied that impacts would be localised and temporary during the construction period only. A condition is imposed (Appendix 3, Part 2, Condition 21) that requires a full assessment of the potential impacts on environmental values associated with The Narrows pipeline crossing including cumulative impacts arising from dredging for the Port of Gladstone Western Basin Dredging Project.

The EIS assessed the proposed impact of the pipeline against the impacts on world heritage and national heritage values, concluding that impacts will be not be significant. The Coordinator-General concurs with this assessment, in particular, that impacts would be localised and temporary during the construction period only.

The potential cumulative impacts of the development of various CSG/LNG proposals in the vicinity of the APLNG pipeline, are noted. A condition is imposed (Appendix 1, Part 1, Condition 13) to ensure that



sufficient information is available to the CSG Industry Monitoring Group to understand and respond to the social and environmental cumulative impacts of the combined CSG and other industries in the region. As outlined in Volume 1 Chapter 6 (section 6.2.21) of the EIS, APLNG has proposed a number of commitments in relation to MNES for the proposed pipeline. The adoption of these commitments in the EM Plan is supported.

10.3. LNG facility

EPBC referral EPBC 2009/4977 was lodged to address the controlled actions requiring assessment for the APLNG LNG facility. The controlling provisions applicable to the LNG facility are:

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

The methodology used to assess the potential MNES impacts relating to the LNG facility involved:

- desktop reviews of relevant literature and existing data
- desktop research including utilisation of EPBC Protected Matters search, Qld Herbarium HERBRECS Flora Collection records, DERM Wildlife Online databases, Birds Australia database, and Queensland Museum Fauna Collection records
- desktop mapping including utilisation of DERM Regional Ecosystem RE mapping, DERM Regulated Growth Vegetation mapping, DERM RE description database, DERM Essential Habitat mapping, Queensland Wetland and Environmentally Sensitive Area mapping, and Directory of Important Wetlands database
- field surveys and sampling.

The EIS provides a description of the existing environment and values relevant to the controlling provisions as applicable to the gas fields (s23.3).

10.3.1. Listed threatened species and communities

Threatened ecological communities

The EIS identified (section 23.3.2) through the EPBC protected matters search tool, two ecological communities listed as 'endangered' under the EPBC Act as potentially existing within the proposed LNG facility:

- Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- Weeping Myall Woodlands.

In addition, one community listed as 'critically endangered' under the EPBC Act was identified as potentially existing—Littoral Rainforests and Coastal Vine Thickets of Eastern Australia.

However, based on available mapping and field assessments, the EIS identified that there are no threatened ecological communities within or adjacent to the LNG facility (section 23.4.3). Therefore development of the proposed LNG facility will not impact upon any threatened communities.

Threatened terrestrial flora and fauna

The EIS identified through desktop searches (section 23.3.2) seven terrestrial flora species listed as threatened under the EPBC Act as potentially existing within the proposed LNG facility. However, the EIS only identified two flora species listed as threatened under the EPBC Act, known to be present on Curtis Island (section 23.3.2):

- Large-fruited zamia palm (*Cycas megacarpa*)
- Quassia (*Quassia bidwillii*).

These are listed as 'endangered' and 'vulnerable' respectively under the EPBC Act. No threatened flora species listed under the EPBC Act were identified on site during the field survey and there are no historical records of these species occurring on or adjacent to the site.



The EIS identified through desktop searches (section 23.3.2) 14 terrestrial fauna species listed as threatened under the EPBC Act as potentially existing within the proposed LNG facility (Table 23.10). However, the EIS identified eight of these 14 species as likely to occur within the LNG facility area:

- Brigalow scaly-foot (*Paradelma orientalis*)
- Yakka skink (*Egernia rugosa*)
- Squatter pigeon southern subspecies (*Geophaps scripta*)
- Red Goshawk (*Erythrorchis radiates*)
- Northern quoll (*Dasyurus hallucatus*)
- Grey-headed flying-fox (*Pteropus poliocephalus*)
- Large-eared pied bat (*Chalinolobus dwyeri*)
- False water-rat (*Xeromys myoides*).

Of these eight fauna species, one is listed as 'endangered' (Northern quoll), and the remaining seven are listed as 'vulnerable' under the EPBC Act.

The EIS includes an assessment of the proposed impact of the LNG facility against the significant impact criteria for the threatened terrestrial flora and fauna (section 23.4.3). The result determined there are no significant impacts predicted for threatened terrestrial flora and fauna species. Although not assessed as significant, the EIS recognises that potential impacts of the LNG facility on terrestrial flora and fauna are likely to be primarily associated with introduction and/or spread of invasive weeds or pests, leaching of pollutants or release of sediment into retained areas of vegetation, air emission impacts, edge effects, fragmentation, altered drainage patterns, habitat loss, degradation, fragmentation, and loss of connectivity due to the physical clearing of vegetation. Mitigation and management measures are designed to limit these impacts on MNES.

10.3.2. Listed migratory species

Threatened marine fauna

The EIS identified through desktop searches (section 23.3.3) 15 marine fauna species (excluding birds) listed as migratory or threatened under the EPBC Act known to occur or likely to occur in the offshore area of the LNG facility (Table 23.11). However, the EIS identified nine of these 15 species as known to occur or likely to occur within the LNG facility marine area:

- Saltwater crocodile (*Crocodylus porosus*)
- Flatback turtle (*Natator depressus*)
- Green turtle (*Chelonia mydas*)
- Loggerhead turtle (*Caretta caretta*)
- Olive Ridley turtle (*Lepidochelys olivacea*)
- Hawksbill turtle (*Eretmochelys imbricate*)
- Dugong (*Dugong dugon*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- Australian snubfin dolphin (*Orcaella heinsohni*).

Of these species, two are listed as 'endangered' under the EPBC Act:

- Loggerhead turtle (*Caretta caretta*)
- Olive Ridley turtle (*Lepidochelys olivacea*).

In addition, three species are listed as 'vulnerable' under the EPBC Act:

- Flatback turtle (*Natator depressus*)
- Green turtle (*Chelonia mydas*)
- Hawksbill turtle (*Eretmochelys imbricate*).

The remaining four species are listed as migratory under the EPBC Act.

The EIS includes an assessment of the proposed impact of the LNG facility against the significant impact criteria for the migratory or threatened marine fauna species (section 23.4.4). The result determined there are no significant impacts predicted for threatened marine fauna species. Although not assessed as significant, the EIS recognises that potential impact of the LNG facility on marine fauna



species could potentially include habitat reclamation, boat strike, noise and light emissions, dredging and waste water discharge. Mitigation and management measures are designed to limit these impacts on MNES.

Listed migratory birds

The EIS identified 56 birds listed as migratory under the EPBC Act known to occur or possibly occur within the LNG facility area (section 23.3.4). Seven out of the 56 birds identified, were confirmed during field surveys of the LNG facility area:

- Eastern reef egret (*Egretta sacra*)
- White-bellied sea eagle (*Haliaeetus leucogaster*)
- Rainbow bee-eater (*Merops ornatus*)
- Whimbrel (*Numenius phaeopus*)
- Pacific golden plover (*Pluvialis fulva*)
- Caspian tern (*Sterna caspia*)
- Eastern curlew (*Numenius madagascariensis*).

In addition to the seven confirmed species, suitable habitat to support an additional 34 bird species is considered to be present in the LNG facility area (Table 23.12).

Given the extent of suitable habitat available in the wider Port Curtis area, the EIS states that it is unlikely that the LNG facility will impact significantly on migratory birds (section 23.4.4). The EIS claims that there should be no degradation of any adjacent habitat providing management guidelines are implemented.

10.3.3. World heritage and national heritage places

The EIS identified one World Heritage site within or adjacent to the proposed LNG facility area—the Great Barrier Reef (section 23.3.1). The proposed LNG facility is located within Gladstone Port limits. Below the mean low water mark, the marine environment is considered located within the Great Barrier Reef World Heritage Area. The Great Barrier Reef was placed on the National Heritage List due to its World Heritage listing. The EIS states that no other heritage sites of national or state significance occur in the vicinity of the LNG facility. The EIS states that no direct impacts to the world heritage or national heritage values will be caused by the LNG facility, however indirect impacts are likely. The EIS considers that construction and operation activities associated with the LNG facility will not cause any loss, degradation or damage of world heritage values.

The Great Barrier Reef Marine Park does not occupy the same spatial extent as the Great Barrier Reef World Heritage Area, and is recognised as a separate MNES. Although within close proximity, the LNG facility does not extend into any area of the Great Barrier Reef Marine Park, therefore the LNG facility is not likely to have a significant impact on its environment.

The EIS includes an assessment of the proposed impact of the pipeline against world heritage and national heritage values (section 23.4.2). The potential impacts to the world heritage values of the Great Barrier Reef as a result of the construction of the LNG facility include:

- outstanding example representing a major stage of the earth's evolutionary history
- outstanding example representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment
- contain unique, rare and superlative natural phenomena, formations and features and areas of exceptional natural beauty
- provide habitats where populations of rare and endangered species of plants and animals still survive.

The result of the assessment determined the impacts on world heritage and national heritage values predicted as a result of the proposed LNG facility to be not of significance or negligible (section 23.4.2). Impacts will be associated primarily with construction rather than operation of the LNG facility and will include modification of stormwater drainage, vegetation removal and associated habitat loss, visual amenity, and noise and air emissions. These impacts are considered minor and mitigation and management measures are designed to limit these impacts on MNES.



10.3.4. Mitigation and management—LNG facility

APLNG propose a number of mitigation and management strategies for the impacts of the proposed LNG facility on MNES. These include:

- limit vegetation clearing as far as practicable and utilise existing tracks and cleared areas where possible
- undertake pre-clearing flora surveys, erosion control measures and fauna management.
- where an EVR or regionally significant species is identified on or adjacent to the proposed LNG facility area, species specific management guidelines will be developed and implemented in accordance with the relevant recovery plans
- develop and implement a biosecurity management plan for all phases of activities in consultation with relevant regulatory authorities
- establish a vegetation offset program approved by DERM and the Commonwealth government for compensation of impacts that can not be adequately reduced through avoidance or mitigation
- establish a process for visual observations and recording of dugongs and cetaceans.
- investigate and work with stakeholders to develop an industry wide approach to boat strike mitigation
- design and implement a sensitive lighting approach at the LNG facility
- be actively involved in the management of the Curtis Island environmental management precinct
- work collaboratively with other Western basin projects to offset the loss of sensitive marine habitat.

10.3.5. Coordinator-General's conclusion—LNG facility

An assessment of the impacts on each MNES present or likely to be present within the LNG facility area has been undertaken in the EIS. The assessment concludes that no action related to the LNG facility will have a significant impact on the elements subject to the relevant controlling provisions on the basis that the proposed mitigation and offset measures are fully implemented.

The EIS assessed that EPBC-listed threatened communities are not present on the Curtis Island project site and that development of the proposed LNG facility will not impact upon any threatened communities. The Coordinator-General concurs with this assessment.

The EIS assessed the proposed impact of the LNG facility against the significant impact criteria for EPBC-listed threatened species and concluded that no significant impacts are predicted. The Coordinator-General concurs with this assessment. No threatened flora species were identified on site and there are no records of threatened flora species previously occurring on, or adjacent to, the site. Although the site is considered likely to support EPBC-listed threatened fauna species from time to time, the habitat associated with the site is not considered to be critical. A condition is imposed (Appendix 1, Part 1, Condition 7) that requires a Significant Species Management Plan to be prepared for all listed threatened species potentially impacted by the project. Where impacts on species cannot be avoided, a condition is imposed (Appendix 1, Part 1, Condition 5) to ensure appropriate offsets are implemented.

The EIS assessed the proposed impact of the LNG facility against the significant impact criteria for the migratory birds, predicting that potentially minor impacts may occur due to the loss or disturbance of habitat areas, particularly within the intertidal zone. The Coordinator-General concurs with this assessment. Relatively minor impacts on migratory marine species may occur on a temporary basis during the construction period caused by dredging and underwater noise sources; however, long-term impacts are predicted to be minimal. A condition is imposed (Appendix 1, Part 1, Condition 7) that requires a Significant Species Management Plan to be prepared for all listed migratory species potentially impacted by the project. Where impacts on species cannot be avoided, a condition is imposed (Appendix 1, Part 1, Condition 5) to ensure appropriate offsets are implemented.

The EIS predicted that the impacts on world heritage and national heritage values, as a result of the proposed LNG facility, would be insignificant or negligible. This is due to the mainly industrial setting of the site in relation to the Port of Gladstone and the relatively minor predicted residual impacts on EPBC-listed communities and species (taking into account mitigation measures and offsets). It is considered that the development on Curtis Island will not substantially fragment, isolate or damage habitat important for the conservation of ecosystems within the World Heritage Area. It is noted that all the LNG



proponents, including APLNG, are contractually obliged to contribute to rehabilitation and management of the (approximately) 4500-hectare Environmental Management Precinct of the Gladstone State Development Area on Curtis Island, which has a similar status to a protected area. It is considered that this requirement could form the basis for any offset required under the EPBC Act.

The Coordinator-General notes the potential cumulative impacts of the development of various LNG proposals on Curtis Island. A condition is imposed (Appendix 1, Part 1, Condition 13) to ensure that sufficient information is available to the CSG Industry Monitoring Group to understand and respond to the social and environmental cumulative impacts of the combined CSG/LNG developments and other industries in the Port Curtis western basin.

As outlined in Volume 1, Chapter 6 (section 6.3.21) of the EIS, APLNG has proposed a number of commitments in relation to MNES for the proposed LNG facility. The Coordinator-General supports the adoption of these commitments in the EM Plan.



11. Conclusions

The Coordinator-General is 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 and as specified in Schedule 1 (Item 2, Class 2) of the bilateral agreement between the Australian and Queensland governments.

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.

This report 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) on Matters of National Environmental Significance of each controlled action for the project.

Conditions have been set 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.

It is considered that, on balance, there are strong positive net advantages to be derived from the project that will benefit the state of Queensland.

Therefore it is recommended that the APLNG project, as described in detail in the EIS and the supplementary information as summarised in section 2, 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, supplementary information and this report's conditions, the conditions shall prevail. APLNG 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, supplementary information and draft EM plans.

Copies of this report will now be issued to:

- APLNG, as the designated proponent representing the APLNG project, in accordance with section 35(5)(a) of the SDPWO Act
- DERM in accordance with section 40 of the SDPWO Act as assessment manager for development approval for operational works pursuant to the SPA, VMA and *Water Act 2000*
- the EP Act Minister in accordance with section 47C(2) of the SDPWO Act in regard to stated environmental authority conditions
- DEEDI as assessment manager for development approval for petroleum authorities pursuant to the P&G Act and as assessment manager for development approval for operational works pursuant to SPA and the *Fisheries Act 1994*
- Gladstone Regional Council, Western Downs Regional Council, Toowoomba and Banana Shire Councils as assessment managers for development approval for any aspects of development within the local government areas pursuant to SPA
- DTMR with regard to transport infrastructure required under the *Transport Infrastructure Act 1994* and *Maritime Safety Regulations 2004*
- GPC as assessment manager for the development within the Gladstone strategic port land.
- Department of Justice and Attorney-General (HICB) as assessment manager for major hazard facilities under the *Dangerous Goods Safety Management Act 2001*
- each nominated entity for an imposed condition listed in Appendix 5
- the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities pursuant to the EPBC Act.



Other advisory agencies, NGOs and private submitters who participated 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 DIP's website at www.dip.qld.gov.au



Appendix 1: Conditions that apply to the whole project—gas fields, gas transmission pipelines and LNG facility

This appendix specifies the Coordinator-General's conditions imposed pursuant to section 54A and 54B of the SDPWO Act.

The conditions have been arranged as follows:

- Part 1 General
- Part 2 Traffic and Transport
- Part 3 Social impacts

Entities with responsibility for implementing the conditions are specified in Appendix 5.

Part 1—General

These conditions are imposed by the Coordinator-General under section 54A and 54B of the SDPWO Act.

Condition 1 Compliance Auditing

The following third party auditing requirements must be applied for the whole project:

1. Compliance with the conditions of this Coordinator-General report, environmental authority(s) and development approvals must be audited by an appropriately qualified third party auditor, nominated by the holder of environmental authority(s) and accepted by the Coordinator-General and administering authority, within one year of the commencement of these petroleum activities, and three yearly thereafter.
2. Upon receipt of the third party audit report, the holder of the environmental authority(s) must submit a copy of the report to the Coordinator-General and to the administering authority.
3. The third party auditor must certify the findings of the audit in the report as being an accurate and independent assessment of compliance with the conditions of this Coordinator-General's report, environmental authority(s) and development approvals.
4. The financial cost of the third party audit must be borne by the proponent.
5. The holder of the environmental authority(s) must, within a reasonable timeframe, agreed to in writing by the administering authorities, act upon any recommendations arising from the audit report.
6. Not more than three (3) months following the submission of the report, the holder of the environmental authority(s) and development approvals must provide written report to the Coordinator-General and administering authority on the:
 - (a) actions taken by the holder to ensure compliance with conditions of the Coordinator-General's report and environmental authority(s) and development approvals
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified by the report of the third party auditor.



Condition 2

Case management costs of government

1. 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
Western Downs Regional Council	2 units
Banana Shire Council	1 unit
Gladstone Ports Corporation	2 units
Maranoa Regional Council	1 unit

2. 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 the *State Development and Public Works Organisation Act 1971*.
3. Payment will be required on submission of the first documentation for assessment by the agency concerned.

Condition 3

Greenhouse Gas Emissions Strategy

1. The proponent must develop and implement a greenhouse gas reduction strategy for the project. The strategy must include, but not be limited to, the following GHG management measures to monitor, assess and (where practicable) reduce GHG generated by the Project:
 - a. Monitor and report GHG emissions as required under the National Greenhouse and Energy Reporting System (NGERS).
 - b. Assess and implement energy efficiency improvement, fuel consumption minimization and GHG emission mitigation actions in accordance with identified Energy Efficiency Opportunities, which should include consideration of the following measures:
 - i. use high grade waste heat from the compressor exhaust gases to provide heat for process requirements
 - ii. install waste heat recovery units to meet the process heat requirements of the LNG facility
 - iii. reduce the glycol regeneration stripping rate (unburnt fuel gas) in winter by at least 5% (compared to the 2009 design baseline) thereby reducing energy requirements and yielding GHG savings
 - iv. use solar energy and electric drives at well heads and gas plants (subject to investigations)
 - v. design generation systems to avoid any dumping of excess generation through load banks
 - vi. implement the biodiversity offset program
 - vii. implement a leak detection and repair program for gas pipelines
 - viii. use high efficiency aero-derivative drivers for refrigerant compressors



- ix. reduce operational flaring and venting by recovering LNG boil-off gas vapours during ship loading and minimising plant shutdowns
2. The strategy must be submitted to the administering authority for approval prior to any significant works commencing.

Condition 4 Annual Environmental Returns

1. An Annual Environmental Return is to be submitted to the administering authority for each environmental authority granted or amended as part of the APLNG project, and in accordance with the following:
 - a) the Annual Environmental Return is to provide details regarding the status of disturbance, progressive rehabilitation and final rehabilitation associated with project activities
 - b) the Annual Environmental Return is to identify all non-compliances with Coordinator-General's Conditions, Environmental Authority Conditions, Operational Plans, and commitments made in the EM Plans supplied with the EA application
 - c) the Annual Environmental Return is to provide details regarding complaints relating to environmental harm and environmental nuisance made during the Period
 - d) the Annual Environmental Return is to identify and amendments needed to the EM Plans to achieve compliance with the Environmental Authorities.
2. The Annual Environmental Return is to be lodged with the administering authority not more than 30 calendar days after the anniversary date of each environmental authority.

Condition 5 Environmental Offsets

1. Prior to commencement of significant construction work, the proponent must submit to the CG for approval and written advice, an Environment Offsets Strategy which addresses the *Queensland Government Environmental Offset Policy 2008* and associated specific issue policies and includes requirements for listed/scheduled species under the *Nature Conservation Act 1992*. The strategy must address impacts on biodiversity, vegetation, wetlands, and coastal and marine areas arising from:
 - a. exploration, development and operation of the coal seam gas fields
 - b. construction and operation the gas transmission pipeline
 - c. construction and operation of the LNG facility
 - d. construction of coastal marine infrastructure
 - e. other activities (e.g. construction camps, port works for the project, ancillary works).
2. The strategy must be supported by a program detailing the following:
 - a. principles adopted for the environmental offsets strategy
 - b. procedures to identify the requirements for environmental offsets for specific components of the project over the life of the project
 - c. relevance to any legislative requirements for offsets
 - d. mechanisms to secure and manage the environmental offset for long term protection of values
 - e. location, size and values that must be offset
 - f. location, size and values of the offsets proposed;
 - g. management measures, including funding, required to maintain or enhance values for the life of the offset, and
 - h. a system for reporting to the CG on offset arrangements; their management; how offset values are met and maintained; and the reconciliation process.
3. The following is an acceptable solution to the reporting system in the Condition above:



- a. an initial offset package, consisting of specific land tenures, their environmental values and related management commitments/funding, is to be provided to the CG and DERM within 6 months of the following:
 - i. the issue of any gas field environmental authorities (pursuant to the EP Act); or
 - ii. amendment of any existing gas field environmental authorities, relating to proposed activities.
- b. the offset package is to be based on the specific offset requirement derived from "ground truthing" of endangered ecosystems or species, biodiversity values and other vegetation proposed to be disturbed under the new or amended environmental authority.
- c. 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.
- d. each operational plan detail (quantity and quality) disturbance and rehabilitation that includes: (a) a current account (audit at commencement of operational plan period) of disturbance; (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.
- e. the disturbance and rehabilitation information provided in the operation plan should be both qualitative and quantitative in its description of biodiversity and vegetation values and use category descriptions that are inclusive of and consistent with the EPBC Act (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).
- f. 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, maintained and updated on the proponent's website for the duration of the project.
- g. A reconciliation statement should be prepared that accounts for the offsets provided against the actual vegetation disturbance and rehabilitation information (qualitative and quantitative).
- h. 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 maintained and updated on the proponent's website for the duration of the project.
- i. the reconciliation statement is updated at least annually by the proponent.
- j. the reconciliation statement (third-party audit reconciled) is to be submitted to the CG, and the relevant State and Commonwealth environment administering authorities for the project (DERM and DSEWPC) on the first annual anniversary of date of approval, and annually thereafter.

Condition 6 Stock Routes

1. The relevant DERM Senior Lands Officer (Stock Routes) and local government stock route officer must be consulted at the construction planning stage.
2. Where there are to be permanent disruptions to the stock route network, the corridors shall be realigned or replaced with a similar width and suitable country type to allow for the unimpeded movement of travelling stock.
3. 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.
4. 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.
5. Adequate watering facilities and other travelling stock infrastructure shall be provided where existing facilities become redundant due to the approved activities.



6. 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

Impacts on native flora and fauna

The proponent must comply with the provisions of the *Nature Conservation Act 1992* (NC Act), particularly in regard to the following:

- a. Where there is a requirement for clearing of plants protected under the NC Act
 - i. clearing of plants must only occur in accordance with a clearing permit or an exemption under the NC Act
 - ii. offsets must be provided for the permanent loss (take) of near threatened, rare, vulnerable and endangered plants to achieve an equivalent or better overall outcome at a regional scale in accordance with the Queensland Government Environmental Offsets Policy 2008 and generally in accordance with the Queensland Government Policy for Biodiversity Offsets (Consultation Draft)
- b. Where the activities of the proponent may cause disturbance to animal breeding places the prior approval of DERM must be obtained.
- c. Where there is a need to take fauna, the prior approval of DERM must be obtained.

Condition 8

Soils management plan

1. Prior to the commencement of petroleum activities the proponent must provide to DERM a soils assessment and management plan for the activities that would be carried out under an environmental authority. The soil management plan must address, but not be limited to the following:
 - a. Soils ground-truthing and mapping, especially all sensitive soil and landform areas in the gasfields and along the pipeline corridor including Good Quality Agricultural Land and Strategic Cropping Land. The appropriate mapping scale must be determined in consultation with DERM.
 - b. An assessment of the potential adverse impacts due to disturbance of problematic soils along with appropriate mitigation and management measures and construction methods applicable to the identified soil types or landforms to minimize the degradation of the soil resource on site, and to avoid off site impacts.
2. As well as activities authorized under this approval, this information should also identify any infrastructure - work camps, water storages, constructed roads, etc that may impact on existing and future land uses.
3. With regard to the gas field activities, land intended for the beneficial use application of treated associated water must be included in the soil assessment and management plan. This would include soil mapping at an appropriate scale to enable a full assessment of potential impacts on the land resources.
4. Areas intended for the Beneficial Use of treated associated water must be included in the soil assessment and management plan. This would include soil mapping at an appropriate scale to enable a full assessment of potential impacts on the land resources. Where the beneficial use is intended for irrigation purposes, an appropriate scale is 1:25 000, and chemical analysis carried out on representative soil samples to ensure there will be no deleterious effects on the irrigated land or on adjacent land and water resources.



Condition 9 Weed and Pest Management

1. Prior to commencement of construction work, the proponent and its contractors must consult with the relevant officers from the Department of Employment, Economic Development and Innovation in respect to the detection and control of weeds and pests.
2. Comprehensive weed management plans to be prepared in consultation with relevant local governments and Biosecurity Queensland, for construction and operational stages of the proposed development (including gas fields, pipelines and the LNG facility).
3. The plans must be reviewed regularly and updated to ensure weed and pest management strategies are based on the most up to date information and amended in response to any changes in the distribution, priority, biosecurity risk and status of weeds and pests.
4. Pursuant to Section 52, Division 2 of the *Land Protection (Pest and Stock Route Management) Act 2002*, the proponent is required to make an application to the Chief Executive of the Department of Employment and Economic Development and Innovation with regard to the Wild Dog Barrier Fence and to the Darling Downs Moreton Rabbit Board with regard to the Darling Downs Moreton Rabbit Board Fence and making openings in these fences for a particular purpose and period.
5. Consistent with the National System for the Prevention of Marine Pest Incursions and in relation to activities undertaken in areas that may disturb littoral and marine areas, the proponent and its contractors must collaborate with Gladstone Port Corporation, to ensure appropriate marine pest management procedures are in place.
6. A management plan must be developed in consultation with Fisheries Queensland and Biosecurity Queensland, to detail measures designed to protect fish habitats from, and to prevent translocation of, pest fish and other water-borne pest species.
7. Any flora or fauna species (including native and exotic species) which may be translocated as a result of treated CSG discharged water into natural water bodies must be monitored and managed in consultation with Fisheries Queensland and Biosecurity Queensland.

Condition 10 Agency approval response

Where approval of plans based on reasonable information is required of state agencies, such approval or disapproval must be provided within one month, provided it is lawful to do so. If there is no response or decision from the agency within one month, the proponent may refer the matter to the Coordinator-General for determination.

Condition 11 Emergency services planning

The proponent must:

1. Consult with the Queensland Police Service (QPS), Department of Community Safety, Queensland Health, any affected local governments, and local emergency services staff in the region, to develop and implement an Emergency Response Plan for the project.
2. Identify in the Emergency Response Plan the roles and responsibilities in incident command and investigation; and include all stakeholders, including QPS in the Emergency Response Exercises.
3. Prior to the construction of workers' accommodation, provide to the Queensland Ambulance Service geo coordinates of camps and information on site access to allow planning for effective service delivery.
4. Work with Queensland Ambulance Service to monitor case loads to determine if the project has placed a strain on existing resources. If service capacity is strained by the project, there may be a



requirement for corrective action on safety/emergency issues and the proponent is required to undertake joint mitigation planning accordingly with Queensland Ambulance Service.

5. Provide site level orientation of all LNG, CPP and FCS facility components (construction and operations) for local emergency services including: the Area Director Gladstone, Emergency Services, and the Local Controller and State Emergency Services Group Leaders of the Gladstone Area, to enable appropriately targeted emergency services planning throughout the life of the project.
6. Update the Performance Monitoring Strategy to include performance measures for the implementation of the Emergency response plan and emergency response exercises.
7. Prior to significant construction, prepare an Emergency Response Plan for construction of the LNG facility and prior to commissioning of Train 1, prepare an Emergency Response Plan for operations of the LNG facility. The Emergency Response Plans must be updated to include additional information which addresses, but is not 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

Condition 12 Historic cultural heritage

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for an EA must include the findings of a pre-construction field survey for historic cultural heritage (non-indigenous) within the pipeline, gas fields and LNG facility disturbance areas, and this should include the assessment of significance and proposed mitigation strategies.

Condition 13 Cumulative Impacts

APLNG shall supply to the CSG Industry Monitoring Group (CIMG) any reports on cumulative impacts that the Group may require for its deliberations and in regard to any regional environmental monitoring programs to be established. Issues on which possible cumulative impacts could be required include:

- a. noise associated with multiple LNG facilities on Curtis Island
- b. impacts on the Gladstone Air Shed from air emissions arising from the multiple LNG facilities
- c. impacts on flora and fauna arising from multiple LNG and other port development on Curtis Island
- d. impacts on marine biological values and water quality from multiple LNG and other port development on Curtis Island
- e. regional impacts on terrestrial flora and fauna, habitat corridors, biodiversity values, listed species and ecosystems arising from the gas transmission pipelines and the development of the gas fields
- f. riparian habitats and aquatic ecosystems; and soils and agricultural production, arising from the gas transmission pipelines and the development of the gas fields.



Condition 14
Protection of Good Quality Agricultural Land

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority an Operations Environmental Management Plan that describes how the positioning, design and operation of petroleum activities will avoid or minimise impacts on land identified as Good Quality Agricultural Land using the assessment methodology that supports the State Planning Policy 1/92 The Protection of Good Quality Agricultural Land Policy particularly the land identified as Class A and B using this methodology.

Condition 15
Review of sampling results

Where monitoring undertaken for the project, or any other circumstance, requires sampling to be undertaken, then the analysis of sampling results must be reviewed within 14 days of availability. Where the results indicate a condition or contaminant level that has caused, or has potential to cause a breach of the EP Act, APLNG must notify the administering authority as soon as practicable.

Recommendation
Strategic cropping land

It is recommended that the proponent should have regard to the Strategic Cropping Land policy framework published in August 2010 by DERM when determining gas field development locations.

Part 2—Traffic and transport

These conditions are imposed by the Coordinator-General under section 54A and 54B of the SDPWO Act

Condition 1

Subject to condition 2 below regarding pipe transport at Gladstone, rail transport from the point of importation to the field marshalling yard must be used for all but 60 kilometres of pipe transport tasks for the export pipeline and gas collection header pipelines.

Condition 2

The proponent must 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 60 km of the pipeline route
- b) the proponent has in place an agreement with Queensland Rail that all pipe products required for the gas transmission pipeline greater than 60 km from Port Central will be transported by rail to, at least, Biloela (or somewhere west of Gladstone to be agreed)
- c) necessary approvals associated with the construction of any laydown areas for pipes are obtained.

If the proponent determines that for either environmental or commercial reasons, it is expedient to utilise another port other than Gladstone or Brisbane 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 3

The proponent must consult with GPC, DTMR (including MSQ), and Gladstone Regional Council (GRC) within 90 calendar days of receiving the final investment decision to proceed to:

1. obtain agreement that the proposed use at each berth that the project plans to use is acceptable to GPC
2. prepare a Gladstone Logistics Plan (GLP) to incorporate typical proposed material and personnel movements (including through the marina area) around Gladstone.
3. The proponent is required to work with the relevant authorities and proponents on how the GLP will be integrated with facilities and movements of other significant project proponents, or projects advised by the Coordinator-General, including the calculation of infrastructure costs
4. submit the GLP for approval to GPC, GRC, DTMR.
5. obtain all the necessary approvals associated with use of a berth location before any significant construction is commenced
6. negotiate, arrange timing to pay and pay for any necessary road and or intersection improvements that may be required as a consequence of the APLNG project proceeding and based on the GLP. The proponent must upgrade, maintain or hand back roads in no worse a state of repair compared with the condition at the start of construction activities. If any agreement between the proponent and GPC, DTMR and GRC is not able to be concluded within six months of submission of the GLP for approval, the proponent may refer the matter to the Coordinator-General for resolution
7. negotiate, arrange timing to pay and pay for any necessary berth upgrades (including associated dredging) and vehicle parking stations that may be required to cater for the extra movement of goods and personnel that the project will generate based on the GLP
8. implement the approved GLP

Condition 4

1. The proponent must prepare, within 90 calendar days of receiving the final investment decision to proceed, a Gas Fields Region Logistics Plan (GFRLP), which must incorporate:
 - a) all proposed material and personnel movements throughout the gas fields region by APLNG, a break-up of transport tasks between road and rail and details of consolidation centres
 - b) details of how transport infrastructure and movements proposed amongst other significant projects and other projects, as agreed between the proponent and DTMR, might be rationalised in an efficient manner
 - c) in relation to b) above, provide details of cost sharing amongst the parties for road and intersection upgrades and provision of any other transport infrastructure.
2. The plan must be submitted to DTMR, and relevant councils for approval. If agreement between the proponent, DTMR and any council is not able to be concluded within six months of submission of the GFRLP for approval, the proponent may refer the matter to the Coordinator-General for resolution
3. The proponent must implement the approved GFRLP.

Condition 5

The proponent must provide bus transportation services for the movement of its construction workforce to and from the marina area at Gladstone 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 6

The proponent must:

1. Within 90 calendar days of receiving the final investment decision to proceed prepare a Marine Traffic Management Plan for vessel traffic management services required in the Gladstone harbour during the construction and operation of the project, ensuring terminology used in the plan is



consistent with *Transport Operations (Marine Safety Regulations 2004)*. DTMR must approve the plan.

2. 12 months prior to the first operations of LNG shipping tankers, finalise and submit to MSQ and the Regional Harbour Master (Gladstone), for review and approval, a Shipping Transport Management Plan for the project, ensuring terminology used in the plan is consistent with the *Transport Operations (Marine Safety Regulations 2004)*. This will include an assessment of maritime safety requirements and ship-sourced pollution for the LNG shipping component of the project. The assessment and provision of mitigation measures must ensure that navigational safety is maintained at all times for the life of the project. Detailed information regarding vessel movements will be required for shipping traffic associated with associated LNG shipping operations. Information should include, but not be limited to:
 - a. types of ships
 - b. size of ships
 - c. maximum draughts
 - d. frequency of movements
 - e. proposed pattern of operation
 - f. berths used and purpose of use.
3. Provide/upgrade all aids to navigation and/or vessel traffic management services required for the project in accordance with the abovementioned plans.
4. Implement the approved Plans. DTMR will be the agency responsible for monitoring compliance with this condition.

Note, where agreement can not be reached between the parties, the matter may be referred to the Coordinator-General for determination.

Condition 7

Low wake impact ferry design and operation methodology shall be utilised to minimise the impact of wash and sediment disturbance on the shorelines of Curtis Island, other affected islands, and the mainland.

Condition 8

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 the CG as inputs to the Study
- b) implement the findings of this Study as determined by the Coordinator-General after consultation with stakeholders, both in finalisation of RMPs and any infrastructure agreements regarding road infrastructure, which may be required to address road impacts.

Condition 9

Within 90 calendar days of receiving the final investment decision to proceed, and prior to any significant construction commencing in the area, 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 DTMR Rockhampton Regional Office and Toowoomba 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 strategies. 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) Update the RMP with outcomes of the Road Transport Cumulative Impacts Study when completed, and the Gladstone and Surat Region Logistics Plans (Conditions 3 and 4 above), and revise road infrastructure agreements as appropriate to the outcomes of the studies and plans.
- 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 DTMR 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 resolution.
- e) The proponent shall upgrade, maintain and hand back roads in no worse a state of repair compared with the condition at the start of construction activities.
- f) Obtain the relevant licenses and permits under the *Transport Infrastructure Act (Qld) 1994* for works within the state-controlled road corridor, prior to undertaking any works.
- g) Within 90 calendar days of completion of each phase of construction involving permanent works within a state-controlled road corridor, submit 'as constructed plans' to DTMR.

DTMR will be the agency responsible for monitoring compliance with this condition. In the event of a dispute either party may refer the matter to the Coordinator-General for resolution.

Condition 10

Within 6 months of receiving the final investment decision to proceed, and prior to commencement of any significant construction in the area, the proponent must:

1. Prepare a local authority Road Inventory for all roads nominated in the EIS and SEIS for potential use by the project detailing:
 - a. condition
 - b. level of service
 - c. traffic count
 - d. any other road and traffic characteristic such as type of user.
2. 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.
3. Identify any requirements for new roads.
4. Prepare a road-use management plan (RMP) for all local roads and any new road proposals 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 strategies. 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.
5. Update the RMP for local roads with outcomes of the Road Transport Cumulative Impacts Study when completed and the Gladstone and Gas Fields Logistics plans, and revise any relevant road infrastructure agreement as appropriate to the outcomes of the studies and plans.



6. Enter into a road infrastructure agreement with the relevant local authority to formalise the amount of, and the timing for the payment of, contributions towards any necessary new roads, road maintenance and upgrades identified in the finalised RMP for local roads. 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 resolution.
7. The proponent shall upgrade, maintain and hand back roads in no worse a state of repair compared with the condition at the start of construction activities.
8. Note that 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 up until 2014 and every 3 years thereafter in line with the proponent's revision of the gas field operations plan.
9. Within 90 calendar days of completion of each phase of construction involving permanent works within a road corridor submit 'as constructed plans' to the relevant local government.

Western Downs Regional Council, Banana Shire Council, Maranoa Regional Council, Gladstone Regional Councils and any other relevant local governments will be the agencies responsible for monitoring compliance with this condition within their respective jurisdictions. In the event of a dispute either party may refer the matter to the Coordinator-General for resolution.

Condition 11

Prior to commencement of any significant construction works for the project, the proponent must:

1. 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 QPS and all affected regional councils.
2. 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 (Qld) 1995*. The proponent must provide forward advice of over-dimensional vehicle movement schedules to QPS, three months in advance of the movement schedule commencing, or later by arrangement with the Regional Traffic Coordinator, Central Police Region, Rockhampton.
3. Implement the approved traffic management plan during construction and commissioning of the project and construction of all roads and intersections.

DTMR, the relevant local government and the QPS are the agencies responsible for monitoring compliance with this condition. In the event of a dispute either party may refer the matter to the Coordinator-General for resolution.

Condition 12

Within 6 months of the final investment decision to proceed, the proponent must:

1. Reach agreement with Western Downs Regional Council, Banana Shire Council, and Maranoa Regional Council, on what upgrades, if any, will be reasonably required at various regional airports and aerodromes and assist the Council obtain the relevant approvals to undertake these works.
2. Reach agreement with these councils on what contribution the proponent will make to the cost of the upgrade/s.

The relevant local council is the agency responsible for monitoring compliance with this condition. In the event of a dispute either party may refer the matter to the Coordinator-General for resolution.



Condition 13

At the end of the first phase of gas field development, or 1 January 2015, whichever comes first, or if the pipeline rail transport contracts fall below 75 per cent of the full pipeline task, the proponent shall:

1. Initiate a revision of the Gas Field Region Logistics Plan to identify proposed material and personnel movements and future transport tasks, for the next phase of project development and operations, which shall be at least a three years projection, or in the case of the pipeline rail transport trigger, for the balance of the 75 per cent of the full pipeline transport task.
2. Include in the revised Gas Field Logistics Plan provisions for cost sharing for future infrastructure alterations and improvements.
3. Submit for approval to DTMR, the Coordinator-General, and relevant local governments for approval, the revised Gas Field Logistics Plan.
4. Implement the approved revised Gas Field Logistics Plan.

Condition 14

The proponent shall work closely with the officers in charge of Gladstone and Dalby District Traffic Branches, Queensland Police Service when developing traffic and transport management plans, to ensure a capability in policing responses to security risks and emergencies is developed cooperatively.

Condition 15

Within six months of the Coordinator-General's Report, or as extended by the Coordinator-General, the proponent must:

1. Commit to 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 flares.
2. 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:

- detailed and cumulative modelling of plume and flare systems
- environmental and economic impact of flare systems, including ground flares
- impacts to consider routine and emergency flaring and gas plumes
- impacts to include a risk-based methodology, utilising statistical analysis
- airport airspace management arrangements
- recommending a range of potential solutions and a preferred solution, in consultation with airport authorities
- 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
- 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

Subsequent to the outcome of the "Cumulative Impact of LNG Project Gas Flares and Plumes on Air Traffic Study", and prior to the commissioning of the LNG facility, the proponent will reach agreement with Gladstone Regional Council regarding a proportion of funding for Instrument Landing Systems for the Gladstone Airport to cater for cumulative air traffic movements. 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.

Recommendation

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

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.

Part 3—Social impacts

These conditions are **imposed** by the Coordinator-General under section 54A and 54B of the SDPWO Act

Condition 1

Social Impact Management Plan (SIMP)

Specification for finalisation of APLNG's SIMPs

1. The proponent must:
 - a) Within 30 calendar days of the project receiving a final investment decision, submit the final SIMPs consistent with the Social Impact Assessment Unit, Department of Infrastructure and Planning SIMP Guideline for review and approval by the Coordinator-General. The final SIMPs must update the mitigation strategies in line with the recommendations set out in this Co-ordinator General's Report and include but not be limited to the:
 - i. monitoring and Review Program to include the role of the RCCCs
 - ii. stakeholder Engagement Strategy to include activities as they relate to land access, property ownership and quality of life issues (noise, dust and hazards)
 - iii. dispute Resolution Mechanism
 - b) Demonstrate that the proponent has taken reasonable steps to achieve agreement on the strategies contained in the final SIMP by the relevant stakeholders and on the lead and assisting roles of stakeholders in the delivery of the SIMP strategies.
 - c) In relation to social impact mitigation strategies, where clear agreement has not yet been reached (and the proponent provides evidence of reasonable steps to achieve agreement), identify the actions proposed to resolve these matters. Outcomes of these stated actions will be reviewed in the first annual report requirements of the SIMP as specified as part of the reporting, review and auditing arrangements.

Reporting, Review and Auditing Arrangements

2. With respect to the approved SIMPs the proponent must:
 - b) submit an annual progress report incorporating any amendments to the SIMPs. The actual date is to be mutually agreed by the proponent and the Social Impact Assessment Unit, Department of Infrastructure and Planning
 - c) undertake an external audit:
 - i. at the completion of the construction stage of the project
 - ii. periodically every 5 years after the commencement of the operational stage, and
 - iii. at project closure during the decommissioning phase of the project.
 - d) prepare and submit a report on each audit's findings to the Coordinator-General
 - e) submit all annual, periodical, and audit reports to the Coordinator-General within 60 calendar days of completion of the relevant period.



The proponent may also elect to conduct additional internal reviews. The results of SIMP reviews will be reported in APLNG's 'Monitoring, Reporting and Review Program (MRRP)' and forwarded to the Coordinator-General.

Requirements for any amendments to the SIMPs

3. The proponent must revise the SIMPs after completion of the construction stage of the project on the basis of the findings of the external audit or advise the Coordinator-General that amendments and updates to the SIMP are required. The proponent will be required to advise DIP that in circumstances where:
 - a) strategies and actions no longer meet the desired outcomes, or require changes to the SIMPs to improve their effectiveness
 - b) changes in government policy, significant changes to company operations and site structure, or significant national/international changes to management approaches and frameworks.
4. Identify a process to facilitate any amendments and agreement between the Coordinator-General and the proponent. If necessary, the Stakeholder Community Engagement Strategy should be updated to describe how stakeholders will be engaged in any change process at the time.
5. Alter, re-structure, re-scope or extinguish the SIMP through agreement by both government, (coordinated by the Coordinator-General) and the proponent, following consultation with key stakeholders, including the Regional Community Consultative Committees (RCCC).

Condition 2

1. Other Social Impact Management Plan (SIMP) requirements

A: Consultative Committees

1. For the life of the project, the proponent is required to establish the Regional Community Consultative Committees (RCCCs) in the Western Downs Region, Maranoa Region, Banana Shire Council Region (predominately) and the Gladstone Region, 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. Specifically, the proponent must:
 - a. have a clear and agreed Terms of References (ToR) for each RCCC, developed in consultation with the RCCC members of each region
 - b. have a role in overseeing the implementation of social impact mitigation and management strategies identified in the EIS process and receive and comment upon reports on the implementation of the Social Impact Management Plan (SIMP). This role is to be reflected in each of the RCCC's ToR
 - c. ensure the membership, as proposed in the draft SIMP by the proponent, is implemented unless an alternative structure is agreed to with RCCC members. This may include a model that combines RCCCs from other LNG Projects
 - d. provide full resourcing and provision of the secretariat services for the RCCCs
2. For the life of the project, the proponent is required to confirm the intention (as proposed in the draft SIMP) to resource the Consultative Committees. The proponent is required to:
 - a. Provide full resourcing of the secretariat and support for the RCCCs to cover in the Western Downs Region , Maranoa Region, Banana Shire Council Region (predominately) and the Gladstone Region, 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



- b. Employ Community Liaison Officers and Shopfront staff at the Gladstone, Chinchilla and Roma locations at a convenient access point for the local community.
- c. Ensure the Community Liaison Officers provides the central point of contact for community relations in respective regions for the life of the project.

B: Industry Leadership Groups

The proponent must:

1. Within one month of Final Investment Decision being received by the third LNG project, the proponent must ensure the RCCC ToR includes APLNG's participation in the Industry Leadership Group for CSG Resource Projects and that regular reports will be provided to the RCCCs; and
2. Participate and contribute to the CSG Industry Monitoring Group once it is established

C: Proponents specific measures for managing social impacts

SIMP initiative in line with the draft SIMP commitments

(a) The proponent must:

(i) Submit copies and/or confirm APLNGs commitments for the project to the Coordinator-General for consideration before the finalisation of the SIMP:

- a. APLNG Project Workforce and Training Strategy and Action Plan
- b. job referral and job advertising service
- c. APLNG Local Content Strategy consistent with the principles of the Australian Government Australian Industry Participation Plan
- d. Community Health and Safety Strategy

(b) The proponent is required to provide not less than six monthly progress reports to all the RCCCs.

Condition 3

Commitments in social mitigation and investment

A: Commitments

The proponent must:

1. Provide a copy of the Commitments Register for the APLNG project to the Coordinator-General, prior to final approval being given to the Social Impact Management Plans (SIMP).
2. Update the APLNG SIMPs to include the commitments.

B: Social mitigation and investment

The proponent must:

1. Submit the final Community Investment Strategy for the APLNG project to the Coordinator-General's approval prior to presenting the final SIMP to the Coordinator-General.
2. When submitting the final SIMP for approval, demonstrate that the investment outlined in the Community Investment Strategy and Commitment Register has been incorporated into the final Social Impact Management Plans and that the proponent has taken reasonable steps to achieve agreement on these commitments with relevant SIMP stakeholders.
3. In relation to social impact mitigation strategies, where clear agreement has not yet been reached refer to Condition 1.1c.



Condition 4

Housing and Accommodation

A: Integrated Housing and Accommodation Strategy (IHAS)

The proponent must:

1. Finalise the IHAS in consultation with the key stakeholders identified in APLNGs draft SIMPs once the proponent's Community Investment Strategy is submitted in final.
2. Demonstrate that the implementation of the proponent's IHAS will address the impacts of each of the APLNG's project components (gas fields, pipeline and LNG Facility) on accommodation and housing. The IHAS will need to be submitted to the Coordinator-General in line with Condition 1.1.
3. Ensure that the IHAS is:
 - a) consistent with the principles underlying the conditions imposed by the Coordinator-General in respect to the other LNG proponents (who have received project approval by the Coordinator-General) towards mitigation and management of housing impacts for Western Downs, Maranoa and Gladstone regions; and
 - b) clearly commensurate with the size and scale of the operation in comparison to other LNG proponents who have received Coordinator-General approval.
4. Include mitigation and management strategies that address the following issues:
 - a. that accommodation provision for the proponent's workforce, not housed in any project specific worker accommodation (eg TAAF), is addressed by a range of means including (but not limited to) direct supply of housing/units, and/or facilitating joint ventures for construction or purchase of dwellings.
 - b. support for investment in affordable housing to mitigate the likely impacts of the project on the housing market and on housing demand.
 - c. monitor the effect of the provision of affordable housing particularly for Indigenous people and low income households, and consider contributing to investment in affordable housing, where appropriate.
 - d. accommodation advice services for workers and families wishing to settle in the APLNG Project, particularly for operational workers in the gas fields including details of incentives for those workers who want to settle into the region (including but not limited to, housing solutions provided by the proponent).

B: Housing for Gladstone region

1. The proponent or its construction contractors shall facilitate housing solutions such as the provision of new or additional housing stock for 50 per cent or other percentage of the projects workforce seeking to settle in the Gladstone Regional Council area as concluded from the Integrated Housing and Accommodation Strategy or/as approved by the Coordinator-General. These solutions will also be developed with advice from the Department of Communities and the stakeholders identified in the proponent's SIMP.
2. APLNG will participate in consultation with other major proponents as directed by the Coordinator-General, and Government agencies to identify co-operative strategies, and participate in regional strategies to resolve project related cumulative housing impacts, with the objective of achieving joint mitigation strategies and deliver housing solutions.
3. It is required that the Integrated Housing and Accommodation Strategy provide six monthly reports to year end 2015 to the Gladstone Regional Community Consultative Committee (RCCC).



C: Housing for Western Downs and Maranoa region

1. The proponent or its construction contractors shall facilitate housing solutions such as the provision of new or additional housing stock to meet as a guide, 75 per cent or other percentage concluded from the Integrated Housing and Accommodation Strategy and approved by the Coordinator-General with advice from the Department of Communities, and the stakeholders identified in the proponent's SIMP, of the project's workforce seeking to settle in the Western Downs and Maranoa Regional Council area.
2. It is required that the Integrated Housing and Accommodation Strategy provide 6 monthly reports to the Western Downs and Maranoa RCCCs.

D: Affordable and community housing solutions

1. The proponent is required to mitigate its impact on accommodation for low income households who maybe impacted by project induced escalation in rental rates or housing prices. This may include facilitating the provision of housing solutions such as new or additional supply of housing stock for the following purposes, progressively as the project workforce increases or by contributing to a Government sponsored community and affordable housing initiative.
2. The proponent must mitigate housing impacts through the development of strategies including the Integrated Housing and Accommodation Strategy as it outlined in the draft SIMP; and in agreement with the key stakeholders listed in the draft SIMP. This will be demonstrated through Condition 4.
3. The proponent is to enter into discussions with key stakeholders, including the RCCCs immediately when the Community Investment Strategy investment for housing is submitted in final to identify how CIS funding will be applied to housing and accommodation mitigation strategies.
4. It is required that six monthly reports on the affordable and community housing solutions is reported on to the Gladstone, Western Downs, Maranoa and Banana Shire RCCCs.

Condition 5

Community engagement and complaints process

A. Community engagement for the APLNG project

The proponent's Community and Stakeholder Plan must include:

1. For the life of the project establish and/or continue to resource dedicated community shopfronts in Roma, Chinchilla, Miles and Gladstone to provide information and community access over the life of the project. Additional shopfronts may be established as the project progresses, depending upon community feedback to the proponent.
2. For the life of the project provide regular progress reports to the Gladstone, Banana, Maranoa and Western Downs Regional Community Consultative Committee (RCCCs) on:
 - a. the Stakeholder Engagement Strategy including providing opportunities for the committees to provide input into community engagement activities in each region
 - b. details of stakeholder issues and the effectiveness of engagement strategies in addressing these
 - c. analysis of issues raised in the Issue Register including details on the actions taken by the proponent in addressing these issues, including mitigation strategies to respond to social impacts .
3. For the life of the project, the proponent 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. This may include survey instruments; market research; community workshops and public information sessions

4. For the life of the project, the proponent must deliver consultation strategies such as:
 - a. workshops on key issues
 - b. community information sessions where members of the public can raise issues of concern
 - c. the development and delivery of a 'Project Newsletter' on a regular basis to provide updates, RCCC meeting dates and highlights; community engagement outcomes; contact points for community information and enquiries and the project's dispute resolution mechanisms.
5. For the life of the project, the proponent must provide details of the engagement strategies that have been established with property owners and regarding land access/use issues.
6. For the life of the project, the proponent must provide details of the engagement strategies that have been applied to inform the community of issues and management strategies associated with noise, vibration, hazard and risk activities to people, property and the environment of abnormal events, natural hazards or accidents associated with construction and operation of the gas fields, pipeline and the LNG Facility
7. Prior to the project closure and the decommissioning of the project component, APLNG must actively inform the community.

APLNG may provide a case to the Coordinator-General to alter, restructure or extinguish these arrangements after agreement by both government (facilitated through the Coordinator-General) and the proponent, following consultation with key stakeholders, including the Regional Community Consultative Committees (RCCC).

B. Complaints process

The proponent's Grievance and Disputes Resolution Policy must:

1. For the life of the project demonstrate that there is:
 - a. a community feedback procedure which includes a 24-hour emergency response line for all members of the community to report incidents or issues relating to safety, health and environmental amenity or harm.
 - b. mechanisms for Stakeholders to provide feedback to APLNG in person, or via a toll free number or to the project email address. Complaints must be acknowledged within 48 hours, and stakeholders advised regularly of progress in addressing their complaint.
 - c. a Complaints Register which allows APLNG to the easily report to RCCCs on the types of complaints, turnaround times for resolution and whether complaints have been addressed satisfactorily.
 - d. adequate avenues to inform the community of APLNG's complaints procedures including face to face meetings, local newsletters, magazines, community notices boards or meeting points and through key community groups and networks (interagency groups)
2. Continue the employment of dedicated Landholder Advisors for the Gas fields and pipeline corridor to ensure landholders have 24-hour access to raise concerns, and dispute resolution mechanism available to them at no cost to the individual or community.
3. Develop and implement the Land Use and Land Access Action Plan (which includes land access protocols). This will be included in the final APLNG SIMP.
4. The proponent's performance in management of complaints is to be included in the Progress Reports as specified in Condition 1.



Recommendation 1 **Social infrastructure Gladstone Region—SISP**

The proponent is encouraged to:

1. Provide reasonable financial contributions to a social infrastructure fund in which industry funds are pooled to mitigate the impacts of major project developments in the Gladstone region and applied to the items listed on the *Gladstone Region Social Infrastructure – Voluntary Industry Contributions Framework*.
2. Participate and/or liaise with the Gladstone Foundation’s Board of Advice to implement a structured process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Gladstone region are addressed.
3. Commit to an on-going investment in social facilities and services in the Gladstone region as a long-term member of the community.

Recommendation 2 **Social infrastructure Roma—Surat Region—SISP**

The proponent is encouraged to:

1. Provide reasonable financial contributions to a social infrastructure fund in which industry funds are pooled to mitigate the impacts of major project developments in the Maranoa/Western Downs region and for this to be done with input from APLNG’s Maranoa and Western Downs RCCCs.
2. Participate as a member of a regional advisory group to implement a structured process for the application and allocation of funds and to ensure the priority needs for social infrastructure and services in Maranoa/Western Downs are addressed.
3. Commit to an on-going investment in social facilities and services in the Maranoa/Western Downs region as a long-term member of the community.

The quantum of the contributions to social infrastructure referred to above requires further development and consultation between the proponent and government. Based on the information presented to the Coordinator-General, it is noted that APLNG already intends to provide contributions to community facilities, services and networks in the Gladstone and Roma Surat region through implementation of its Community Investment Strategy and the Coordinator-General will consider these commitments when determining the ‘reasonableness’ of financial contributions to be provided to the pooled fund.

This will be informed by the outcomes of studies such as the SISP for the Gladstone region and similar studies for Roma Surat region. This will be part of the Surat Future Direction Statement and Program identified under the Queensland Government’s *Sustainable Resource Communities Policy*.



Appendix 2: Conditions that apply to the gas fields

This appendix specifies the Coordinator-General's conditions that apply to the gas fields. These conditions are additional to those specified in Appendix 1.

The conditions have been arranged as follows:

- Part 1 General—imposed under section 54A and 54B of the SDPWO Act
- Part 2 Environmental—imposed under section 54A and 54B of the SDPWO Act
- Part 3 CSG model conditions—imposed for environmental authorities under the EP Act.

Entities responsible for implementing conditions are specified in Appendix 5.

Part 1—General

Condition 1

Temporary workers accommodation—location

Prior to construction, consultation with the relevant local government authority is to be undertaken to determine the appropriate location for all TWAFs. Consideration must be given to regional and local planning issues.

TWAFs must not be constructed on land identified as good Quality Agricultural Land Categories A and B, as described in State Planning Policy 1/92. In no case are they to remain in position for in excess of 5 years unless approved by the relevant local government authority..

Condition 2

Temporary workers accommodation—building standards

All TWAFs must:

- a) allow for sufficient social and recreational opportunities
- b) be constructed in a manner that provides a high quality living experience for residents, including providing adequate visual and acoustic privacy for residents
- c) be constructed in a manner that complies with the Queensland Development Code (MP3.3); and
- d) be constructed in a manner that incorporates energy efficient design.

Condition 3

Temporary workers accommodation—sewerage systems

Prior to commencement of works, the appropriate methods for sewage treatment (in accordance with requirements of the relevant local government and DERM) are to be ascertained and implemented.

All sewage treatment systems associated with TWAFs must be located above Q50 flood levels for shorter term TWAFs and Q100 levels for longer term TWAFs. Longer term TWAFs are those facilities which are to be located in the one place for more than 5 years.

Condition 4

Temporary workers accommodation—flood levels

All TWAFs must be located above Q50 flood levels for shorter term TWAFs and Q100 levels for longer term TWAFs. Longer term TWAFs are those facilities which are to be located in the one place for more than 5 years.



Condition 5
Temporary workers accommodation—noise

All TWAFs must be constructed to meet the noise objectives at sensitive receptors set out in Table 11.1:

Table 11.1—Temporary workers accommodation—noise

Time	Noise objectives for indoors, measured at the receptor in dB(A)		
	LAeq,adj,1hr	LA10,adj,1hr	LA1,adj,1hr
Day and evening	35	40	45
Night-time	35	40	45

Condition 6
Waste disposal

Prior to commencement of works, the appropriate methods for disposal of waste (in accordance with requirements of the relevant local government and DERM) are to be ascertained and implemented.

Condition 7
Potable water

The proponent must ensure that all potable water consumed on the site and at TWAFs complies with the *Australian Drinking Water Guideline 2004*.

Condition 8
Council infrastructure 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. This includes servicing of workers' accommodation. The proponent must then meet the project's relative share of the costs associated with these upgrades.

Condition 9
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.

Condition 10
Rural residential allotments, impact management

1. Prior to the issue of the Environmental Authority for a petroleum tenement over land that contains rural residential allotments, a rural residential code of conduct (RRCC) must be submitted to the Coordinator General for approval. The Coordinator-General must be satisfied that action has been taken to engage with the occupiers of the rural residential land and to address their concerns by at least the inclusion in the RRCC of matters referred to in this condition.
2. The RRCC must apply to areas where there is a collection of allotments less than 15 hectares in individual area.
3. The RRCC must incorporate or refer to all relevant matters dealt with under the Queensland Mining, Petroleum and Gas, Geothermal and Greenhouse Gas Storage Land Access Code, June 2010.
4. The RRCC must provide commitments that specifically address on-going consultation and engagement arrangements to resolve residents' concerns and develop additional actions, if needed,



to address any new issues should they arise during the life of the development ; including but not limited to:

- a. On-site meetings conducted at least three weeks prior to the time when any new activity is proposed to commence on the relevant allotment, or 1 week prior to a recommencement of activity after four weeks of inactivity.
- b. Identifying residents on nearby allotments likely to be affected by noise, dust, light or other nuisance issues arising from the gas field development, and properly informing residents of the nature and effect of the proposed activities in a similar time frame to the resident.

Note: For the purpose of references to consultation, the Coordinator General recognises these neighbours as stakeholders and affected parties, and all consultation courtesies and obligations imposed upon a tenure holder should be extended to surrounding properties in the rural residential area.

5. The RRCC must provide commitments which specifically address the health, and safety of the occupiers of rural residential land through actions including but not limited to:
 - a. Erection of security fencing and fitting of locks on gas infrastructure wherever possible, to prevent unauthorised access to, tampering, or operation of existing gas development sites (both exploratory and production) by children and others who are not aware of the dangers associated with gas wells and other infrastructure.
 - b. Assessment of gas well infrastructure to identify and seal all gas leaks. This is a matter of major concern to the landholders, in terms of risks to human health and risks associated with fire and explosion.
 - c. Health and safety induction training for residents on whose land gas infrastructure has been constructed to explain the equipment and what it is doing.
6. The RRCC must describe actions to be taken and separation distances to alleviate risks to existing rural residential use and infrastructure by minimising or avoiding the potential effects of drilling and fracking activities that might result in:
 - a. stress to stock
 - b. soil movement resulting in cracking of building foundations and walls
 - c. failure of dams or other earthworks.
7. The RRCC shall describe actions to be taken and separation distances to
 - a. mitigate noise impacts on occupiers from existing infrastructure
 - b. prevent dust impacts through dust suppression activities including use of associated water and the potential for run-off related impacts
 - c. prevent salinisation of soils from application of associated water for irrigation or from run-off and implications for certified organic farming.
8. The proponent must report on actions to be taken to ensure the revised Code of Conduct shall incorporate the objectives and strategies of the final social impact management plan (SIMP) for consideration by the Coordinator General.
9. The SIMP submitted for the Coordinator-General's consideration in accordance with Condition 1 of Appendix 1 Part 3, must be fully integrated with the proponent's ISO14001 Environmental Management System, and contain commitments as to implementation of the RRCC in rural residential landholdings.

Part 2—Environmental

Condition 1 Constraints Planning

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a constraints plan and field development protocol for the development of petroleum activities that shows how the following constraints have been identified and avoided.



2. The plan must include:
 - a. all category A, B and C environmentally sensitive areas. It should be noted that 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
 - viii. “Of concern” regional ecosystems identified in the database maintained by DERM called ‘Regional ecosystem description database’ containing regional ecosystem numbers and descriptions
 - b. air emissions
 - c. soils and landscape constraints — including Good Quality Agricultural Land and potential erosion, salinity and sodicity risk areas
 - d. floodplain areas that are likely to be flooded by runoff events of less than 1:100 yr average recurrence interval (ARI). Permanent infrastructure that may concentrate or divert flood flows, or increase the risk of environmental damage (e.g. risks overflow of brine ponds or other storages) should be precluded from such areas. Includes the notification of petroleum activities in Riverine Improvement Trust asset areas
 - e. bioregional corridors
 - f. other constraints identified in the EIS and supplemental information.
3. The constraints plan and field development protocol must:
 - a. be consistent with the management plans of the relevant Regional NRM Bodies
 - b. address the property management plans of the relevant landholders
 - c. commit to undertaking and documenting field surveys for all classes of constraint prior to commencing petroleum activities
 - d. commit that field surveys inform the Field Management Protocols and will be undertaken at all times by a qualified person
 - e. commit to incorporating constraint commitments into operational plans for the life of the project.

Condition 2

Noise constraints plan for fixed plant in gas fields

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a noise constraints plan.
2. The plan must address, but not be limited to:
 - a. How gas field planning will avoid or mitigate the potential impacts from noise to sensitive receptors for the gas fields consistent with the requirements of the *Environmental Protection (Noise) Policy 2008* and the EP Act. The noise constraints plan must implement the following noise hierarchy for fixed plant:
 - i. The design criteria for fixed plant should achieve 25dB(A)_{LAeq,adj,15min} for night time (10pm to 7am) measured at a sensitive receptor. To achieve 25dB(A)_{LAeq,adj,15min} for night time (10pm to 7am) measured at a sensitive receptor both the constraints planning/ field development protocol and best practice noise abatement measures must be addressed.
 - ii. In those fixed plant locations that cannot meet the design criteria of 25dB(A)_{LAeq,adj,15min} for night time despite implementation of constraints planning/ field development protocol



and the adoption of best practice noise abatement measures the noise when measured at any sensitive receptor from fixed plant must not exceed 28dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am).

- iii. If circumstances prevent accurate assessment of noise levels within existing buildings, an alternative approach must be negotiated with DERM.
3. The noise constraints plan must address, but not be limited to, the following:
 - a. monitoring program for evaluation of compliance following commissioning and periodically thereafter
 - b. community liaison and consultation
 - c. the method of handling noise complaints
 - d. training of staff and contractors in noise management practices.
 4. The noise constraints plan must provide commitments to conduct a site based noise assessment for each item of fixed plant in the gas field. The assessment should address, but not be limited to:
 - a. the Environmental Protection (Noise) Policy 2008 and DERM guideline: *Planning for Noise Control*
 - b. implement and address the requirements of the noise constraints plan containing the noise management hierarchy for fixed plant in the gas fields
 - c. identification of component noise sources and activities at the place(s) which impact on noise sensitive receptors
 - d. the measured and/or predicted noise level of these noise sources and activities at noise sensitive receptors
 - e. the reasonable and practicable control or abatement measures (including location of infrastructure and hours of operation) that can be undertaken to reduce identified intrusive noise sources
 - f. the reduction in noise level at noise sensitive receptors following the implementation of noise measures in e) above
 - g. a determination of compliance with the noise hierarchy for drilling activities.

Condition 3

Noise constraints plan for drilling activities in gas fields

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a noise constraints plan. The plan must address, but not be limited to:
 - a. Mitigation of the potential impacts from drilling noise (including fracking and cavitation) to sensitive receptors for the gas fields consistent with the requirements of the *Environmental Protection (Noise) Policy 2008* and the EP Act. The noise constraints plan must implement the following noise hierarchy for drilling activities:
 - i. The design criteria for drilling activities should achieve 25dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am) measured at a sensitive receptor. To achieve 25dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am) measured at a sensitive receptor both the constraints planning/ field development protocol and best practice noise abatement measures must be addressed.
 - ii. In those drilling locations that cannot meet the design criteria of 25dB(A) $L_{Aeq,adj,15min}$ despite implementation of constraints planning/ field development protocol and the adoption of best practice noise abatement measures the noise when measured indoors at any sensitive receptor from drilling activities must not exceed 30dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am).
 - iii. In those drilling locations that cannot meet 30dB(A) $L_{Aeq,adj,15min}$ when measured indoors at any sensitive receptor despite implementation of constraints planning/ field development protocol and the adoption of best practice noise abatement measures then the constraints plan must commit APLNG to making alternative agreements with the affected sensitive receptors.



- b. As a minimum each agreement of an alternative arrangement must be in writing and state:
 - i. the location of the drilling activities
 - ii. the location of the sensitive receptor
 - iii. the names of the affected persons
 - iv. the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation, attenuation of noise at the sensitive place, a benefit to offset the impact of drilling noise, acquisition of the sensitive place)
 - v. the period of the alternative arrangement(s).
- c. Where alternative agreements cannot be made with sensitive receptors alternative engineering solutions or location of drilling activities must be sought.
2. The noise constraints plan must include commitments to consult with sensitive receptors where $25\text{dB(A)}_{\text{LAeq,adj,15min}}$ is predicted to be exceeded at night time from drilling activities when measured at the sensitive receptor.
3. The noise constraints plan must include a program for continual improvement for drilling activities. The program for continual improvement must include a review of available technology every three years for inclusion in the operational plan for the project.
4. The noise constraints plan must also address commitments to, but not be limited to, the following:
 - a. a monitoring program to evaluate compliance occurring at least weekly
 - b. community liaison and consultation
 - c. the method of handling noise complaints
 - d. training of staff and contractors in noise management practices.
5. The noise constraints plan must provide commitments to conduct a site based noise assessment for each drilling activity in the gas field. The assessment should address, but not be limited to:
 - a. the Environmental Protection (Noise) Policy 2008 and the DERM guideline: *Planning for Noise Control*
 - b. implement and address the requirements of the noise management plan containing the noise management hierarchy for drilling activities in the gas fields
 - c. identification of component noise sources and activities at the place(s) which impact on noise sensitive receptors
 - d. the measured and/or predicted noise level of these noise sources and activities at noise sensitive receptors
 - e. the reasonable and practicable control or abatement measures (including location of infrastructure and hours of operation) that can be undertaken to reduce identified intrusive noise sources
 - f. the reduction in noise level at noise sensitive receptors following the implementation of noise measures in e) above
 - g. a determination of compliance with the noise hierarchy for drilling activities.

Condition 4

Coal Seam Gas Water Management Plan

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a Coal Seam Gas Water Management Plan (CWMP) for the tenure relevant to the particular EA. The CSG Water Management Plan must address, but not be limited to:
 - a. the Queensland Government's policy on Coal Seam Gas Water Management
 - b. the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*



- c. the DERM Guideline: *Approval of coal seam gas water for beneficial use*
- d. the Environmental Protection (Waste Management) Regulation 2000
- e. the DERM Healthy Headwaters study: *Characterisation of salinity limits related to the use of CSG water for irrigation* (DERM, January 2010)
- f. the requirements of and comply with (s310 D) to the *Environmental Protection Act 1994*, including the requirement to 'state measurable criteria'; and other statutory requirements, including but not limited to: the requirements of the *Water Act 2000*, *Water Supply (Reliability and Safety) Act 2008* and the *Public Health Regulation 2005*
- g. the cumulative impacts to environmental values from multiple discharges to all relevant surface and ground water systems in the region to the best extent known to the proponent.
- h. The Queensland Government's CSG water Groundwater Injection Policy position

Condition 5

Coal Seam Gas Operational Plan

1. Prior to commencing significant construction activities, the proponent must provide provide to DERM for review and assessment, an operational plan that provides detailed information about the activities and their scheduling that are to be carried out under the environmental authority. In this regard, the operational plan must include a construction management plan for the petroleum tenure for the gas fields that includes the 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.
2. The Operational Plan must cover development of the gas fields for the initial 5 years. 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*.
2. The Operational Plan must be consistent with the requirements of the environmental authorities and the EM Plans developed in accordance with section 310D of the EP Act to support the application for the gas fields and include, but not be limited to:
 - a. a stated period, not exceeding five (5) years for subsequent operational plans, to which the operational 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:
 - i. records 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; 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 operational 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 (e.g. tenure, coordinates) and disturbance type (e.g. well lease, flow line, access track)
 - ii. area to be rehabilitated



- iii. performance criteria
- 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 operational plan
- h. the 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 6 Brine and salts management plan

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a Salinity Management Plan for the tenure relevant to the particular EA.
2. The Salinity Management Plan must address, but not be limited to:
 - a. the Queensland Government's policy on Coal Seam Gas Water Management
 - b. the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*
 - c. a plan for the containment, use and disposal of salt brought to the surface through CSG production, and produced through the treatment of CSG water
 - d. any plan for reinjection of brine or untreated water
 - e. any long-term plan for the utilization of salts extracted from associated water
 - f. an assessment of the potential impacts of options considered and appropriate mitigation measure for the preferred option having regard to the decision hierarchy identified in government policy and guidelines
 - g. a risk assessment methodology which will identify the potential for secondary salinity due to the company's activities. This must include an investigation into wind-borne salt from brine ponds and aggregation dams
 - h. a list of identified management tools and mitigations that will be used in those locations to minimise and manage the risk of secondary salinity
 - i. a commitment to assess and report to the administering authority disturbance and rehabilitation activities which affect salinity risk for each 12 month period of the environmental authority.

Condition 7 Discharge to surface waters

1. Where it is proposed to release treated CSG water to a watercourse, the EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for an EA for a gas field development area, must include a CSG water release strategy as part of each CSG water management plan.
2. The CSG water release strategy must, at a minimum:
 - a. include rules for CSG water releases to the watercourse based on observed flows
 - b. include trigger thresholds for the commencement and cessation of releases



- c. ensure protection and/ or improvement of flow regime towards 'naturalness' including protection of pre-development 'no flow periods' and protection and/or restoration of natural variability of flows
 - d. demonstrate consistency of the CSG release proposal with respect to the relevant Water Resource Plan (WRP) objectives and outcomes
 - e. identify and minimise the possible adverse bio-physical impacts of releasing treated CSG water into natural watercourse environments (e.g. risk of soil minerals being absorbed, increased light penetration, etc) and considers bank stability, bank slumping, sedimentation, and impacts on soil chemistry
 - f. include a monitoring and reporting schedule including potential establishment of any new gauging station/s.
3. The release strategy must be developed taking into account:
 - a. hydrologic modeling of the pre and post development river flow regime for downstream reaches of the CSG water release point. (Any wetting of the flow regime beyond pre-development levels may not be acceptable as this is an environmental negative in ephemeral environments)
 - b. cumulative impacts of CSG releases on the flow regime and water quality for ecosystem health and public health requirements
 - c. risks associated with identified potential outcomes due to altered hydrology and water quality
 4. The proponent may consider the need for systems and structures (eg: off-stream storages to store and release) to ensure the release rules can be met.
 5. In systems where detailed pre-development model/s are not available, a precautionary approach to release rules must be adopted.

Condition 8 Public Health Water Quality Standards

1. Prior to any discharge of treated CSG water the proponent must have either:
 - a. Appropriate approvals under the *Water Supply (Safety and Reliability) Act 2008*; or
 - b. Another appropriate approval that includes conditions requiring:
 - i. details of the infrastructure for the production and supply, or supply only, of CSG water
 - ii. a verification plan for final water quality
 - iii. details of the water quality monitoring program
 - iv. initial water quality results
 - v. an incident and emergency response plan that demonstrates how these activities will be appropriately managed to ensure protection of public health.

Condition 9 Aggregation Dams, Evaporation Dams and Brine Dams

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include design for Aggregation dams, CSG water dams and Brine dams establishing that they will:
 - 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 either the floor or sides of the dam; and



- c. either, be capable of repair to rectify any passage of the wetting front through either the floor or sides of the dam, or else be decommissioned and rehabilitated.
2. Brine dams must have a system for the collection and proper disposal of any contaminants that move beyond the bounds of the containment system.
3. The design, construction, operation, modification and decommissioning of any regulated dam that is part of a CSG project must be undertaken in accordance with DERM's *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams* and the accompanying Guideline *Dams in Environmentally Relevant Activities*. (Draft as of 1st September 2010)

Definitions

Aggregation dam is a dam that receives and contains CSG water or CSG water concentrate. An aggregation dam 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.

Brine is defined as saline water with a total dissolved solid concentration greater than 40 000mg/l.

Brine dam means a dam designed to receive, contain or evaporate brine.

CSG water is defined as underground water brought to the surface of the earth or moved underground in connection with exploring for or producing coal seam gas.

CSG water concentrate is the concentrated saline water waste stream from a water treatment process that does not exceed a total dissolved solid concentration of 40 000mg/l.

CSG evaporation dam is defined as an impoundment, enclosure or structure that is designed to be used to hold CSG water for evaporation.

Condition 10

Groundwater monitoring

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a groundwater monitoring plan for all aquifers potentially affected by the petroleum activities.
2. The plan must include:
 - a. appropriate parameters, on location and frequency of monitoring, and a timetable for implementation
 - b. parameters that will identify potential contamination of the aquifers of the GAB from CSG activities, including possible impacts from chemical additives used in drilling and hydraulic fracturing
 - c. baseline data collection, including a comprehensive inventory of bores and of existing water levels
 - d. baseline data on monitoring of specific parameters at selected locations and frequency in accordance with the monitoring strategy across the project.
3. The monitoring plan must be capable of detecting changes in ground water level or pressure as well as any contamination that may occur due to the petroleum activities undertaken by APLNG or its contractors.
4. The monitoring plan must include water quality monitoring parameters that may be necessary to assesses potential contamination from CSG activities, including possible impacts from hydraulic fracturing.

Note 1 The monitoring plan will need to be adaptive as knowledge of aquifer system responses become clearer. The administering authority may require the proponent to vary the monitoring



plan from time to time during the life of the project in response to each underground water impact report.

Note 2 It is understood the Queensland Water Commission will manage cumulative impacts of the CSG industry on aquifers in areas where impacts from multiple CSG tenure holders may overlap. QWC will develop and manage a regional groundwater model for areas where cumulative impact is expected to occur, such as the Surat Basin. It is understood that the Commission will also be responsible for regional monitoring of groundwater impacts and for preparing impact reports for cumulative impact areas.

**Condition 11
Groundwater modelling**

1. The proponent must provide to the administering authority all relevant information to assist in the development of an industry cumulative groundwater model in accordance with the *Water Act 2000*.
2. The proponent must liaise with administering authority about transitioning the implementation of groundwater modelling, groundwater monitoring and the management of the 'make good' provisions from its individual project management approach to the proposed cumulative management approach.

**Condition 12
Groundwater and springs assessment**

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a report on its ongoing assessment of risks to groundwater dependant ecosystems (including springs and river reaches dependent on base flow) that could be affected by its CSG activities; and a strategy to minimise or mitigate these risks.

**Condition 13
Proponent trials for injection to aquifers**

1. The proponent must provide to the administering authority a report each year on progress with its injection trials.
2. The proponent must have regard to the Queensland Government's policy position on injection to aquifers.

**Condition 14
Groundwater Impacts assessment**

1. Prior to the commencement of petroleum activities in the gas fields, the proponent must provide to the administering authority for review, an assessment of environmental values, and impact mitigation measures. The assessment must address, but not be limited to:
 - 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 & 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. 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.
 - c. 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).



2. The effects of any re-injecting of CSG water must be included in groundwater impact assessment.

Condition 15

Borrow pits

Prior to the construction of borrow pits the proponent must undertake an assessment of the environmental values, potential impacts, mitigation measures for the siting, construction, operation, decommissioning and rehabilitation of borrow pits required for petroleum activities and will provide this assessment to the administering authority.

Condition 16

Access tracks in ESA's

New access tracks are not permitted within Category B or C Environmentally Sensitive Areas unless they are co-located with gas collection or CSG associated water pipelines, unless otherwise authorised by the administering authority.

Condition 17

Ramp-up gas

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include an assessment of the environmental values, potential impacts, mitigation measures for any ramp up gas storage.

Condition 18

Dam decommissioning

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include an assessment of the disposal options for any contaminated material (i.e. salt or dam liners) in accordance with the DERM waste management hierarchy and consistent with the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
2. Decommissioned dams are to be rehabilitated and the landform must be reinstated such that it will not function as a dam and will be stable and sustainable for the foreseeable future (unless otherwise negotiated with landholders). A minimum depth of 0.25m topsoil must be placed over decommissioned storage dams to ensure an adequate vegetal cover can be established.

Condition 19

Water quality and aquatic ecology monitoring

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include a monitoring program of water quality and aquatic ecological parameters at sites upstream and downstream of the proponent's gas fields activities where the proponent's activities will have impacts on surface runoff. The program should:
 - a. have clearly defined objectives
 - b. be developed in consultation with DERM and Queensland Fisheries
 - c. be developed by an accredited third party
 - d. accord with the DERM Monitoring and Sampling Manual
 - e. accord with the Queensland Water Quality Guidelines
 - f. draw upon the wet-season aquatic ecologic monitoring undertaken subsequent to the EIS



- g. draw upon, and be coordinated with, other river health monitoring programs such as the Sustainable Rivers Audit
 - h. include visual assessments and a photographic record in regard to any impacts from overland flow such as gullyng, impacts to sediment and erosion control structures and exposure of pipes
 - i. include monitoring of the riparian zone adjacent to the proponent's activities
 - j. be integrated with the flow quantity gauging program developed in association with any treated CSG water discharge to a watercourse
 - k. be designed to not result in a deterioration of either water quality or aquatic ecosystem health directly attributable to the proponent's activities compared with baseline conditions
 - l. specify how monitoring data will be collected, the frequency of collection, its analysis, review and reporting
 - m. include a focus on salinity and ecosystem health.
2. Where treated CSG water discharges are proposed the program must include an eco-toxicology risk assessment, including the possible accumulation of constituents. The risk assessment should include the following:
- a. monitoring contaminants of potential concern in the treated discharge and in the receiving environment
 - b. comparing the concentration of contaminants of potential concern to water quality objectives including relevant published toxicant trigger values
 - c. where guideline trigger values are exceeded, or in the absence of guideline values, where a potential risk to environmental values has been identified, performing an ecotoxicological risk assessment in accordance with the ANZECC/ARMCANZ (2000) methodology which may require performing toxicity bioassay(s) and/or a direct toxicity assessment(s). The risk assessment should take into consideration important operational and environmental factors such as background environmental concentrations, persistence and degradation rates, and any other relevant environmental fate considerations
 - d. where contaminants of concern in the discharge are known to be bioaccumulating substances and exceed background concentrations, the proponent must design and implement a biological monitoring program that compares the body burdens of contaminants of concern in upstream or reference sites with those of downstream or impacted monitoring sites.. Statistical comparison of body burdens recorded in upstream (unimpacted) monitoring sites to those in downstream (impacted) monitoring sites and interpretation of the results need to be reported to the administering authority within an agreed timeframe
 - e. in designing an ecotoxicology study (as per C25(2)c) or biological monitoring program (as per C25(2)d) the proponent must take into account the concerns and recommendations of the administering authority. The program must be accepted by the administering authority prior to commencement of related works
3. Where remote instrumentation is used to capture water quality data this must be validated as per equipment specification by comparison to equivalent laboratory-based analysis results to ensure quality and reliability in the measures recorded.



Condition 20
Surface Water monitoring sites

The EM Plan developed in accordance with section 310D of the EP Act to support the application for an EA for a gas field development area must include upstream and downstream monitoring of water quality parameters where discharges are proposed.

Condition 21
Receiving Environment Monitoring Program

The EM Plan developed in accordance with section 310D of the EP Act to support the application for the gas fields, must include a receiving environment monitoring program to monitor and record the effects of the release of contaminants on the receiving environment, 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.

Condition 22
Hydraulic fracturing chemicals

1. The EM Plan developed in accordance with section 310D of the EP Act to support the application for an EA for a gas field development area must include, where hydraulic fracturing is proposed, an independent scientific assessment of the possible impacts from hydraulic fracturing.
2. The assessment must address, but not be limited to:
 - a. a complete inventory of biocides, corrosion inhibitors and all other chemicals used in drilling, completions and stimulation operations (hydraulic fracturing).
 - b. toxicity data for each chemical and any mixture of chemicals.
 - c. details of where, when and how often drilling, completions and stimulation operations are to be undertaken.
 - d. a risk assessment of the potential for drilling, completions and stimulation operations to cause environmental harm to the receiving environment.
 - e. the risk assessment must include but not be limited to: a mass balance determining the concentrations and absolute masses of chemicals that will be left *in situ* subsequent to drilling, completions and stimulation operations, and the results of any fluid monitoring undertaken in the course of previous drilling, completions and stimulation operations.
 - f. the long-term monitoring program of drilling, completions and stimulation operations fluid chemical concentrations in water produced from wells that is to be implemented by the proponent.
 - g. management measures that will be taken to avoid and mitigate any potential adverse impact on environmental values.

Condition 23
Synthetic drilling muds

Based on the model conditions for CSG activities, the model conditions stated below will be imposed on any Environmental Authority for the Gas Fields:

- oil-based drilling muds must not be used in the carrying out of the petroleum activity
- 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.

Condition 24
Pad drilling (multiple drill holes from the one location)

The EM Plan developed in accordance with section 310D of the EP Act to support the application for an EA for a gas field development area, should include consideration of pad drilling wherever medium or high environmental values, including strategic cropping lands are impacted by the petroleum activities.



The EMP must demonstrate that where pad drilling is shown to be not feasible, alternative ways of siting drilling rigs and other petroleum facilities are proposed to protect environmental values.

Condition 25

Quarrying

Separation distances from CSG activities should be established in consultation with quarry operators and local governments to enable existing and planned quarrying to continue within the petroleum tenement areas.

Condition 26

Gas trunkline easements

The EM Plan developed in accordance with section 310D of the EP Act to support the application for an EA for a gas field development area, must include an assessment of the construction of co-located trunklines to minimise width and total disturbance required for the right of way.

RECOMMENDATIONS

Recommendation 1

Notification regarding Millable Timber

Sufficient lead time should be provided for DERM to arrange timber salvage operations or the proponent will need to provide alternative solutions for responsible resource utilisation.

Recommendation 2

Strategic cropping land

It is recommended that the proponent should have regard to the Strategic Cropping Land policy framework published in August 2010 by DERM when determining gas field development locations.

Part 3—CSG model conditions

DERM, in consultation with the Australian Petroleum Production and Exploration Association (APEA), has developed ‘Model Conditions’ that guide environmental authority applicants for coal seam gas fields.

The Model Conditions provide 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.

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		



Tenure No.	Petroleum Activity	Number	Maximum size (where applicable)
	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
- 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
 - 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:



- iii. location (e.g. tenure, coordinates) and disturbance type (e.g. well lease, flow line, access track)
- iv. area to be rehabilitated
- v. use of reference sites
- vi. species compositions
- vii. 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
- 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
- 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



- 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%; 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:
- a. conducting work in times of no flow; and
 - b. 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

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:
 - 1. will deliver the performance stated in the design plan
 - 2. 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”*
 - 3. 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:



1. a statement of the relevant legislation, regulatory documents and engineering practice relied upon in the design plan
 2. a statement of the facts and data being used in the design plan and the limitations to the application and interpretation of that material
 3. 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
 4. detailed specifications for the design, operation, maintenance and decommissioning of the dam(s)
 5. 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
 6. design, specification and operational rules for any related structures and systems used to prevent the overtopping of the proposed dam
 7. a detailed plan for the decommissioning and rehabilitation of the dam at the end of its operational life
 8. any other matter required by the certifying suitably qualified and experienced person
 9. 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:
1. the conditions of this environmental authority, or
 2. the requirements set out in the “Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”
 3. 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:
1. exploring for petroleum is the only activity being carried out
 2. 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
 3. the evaporation dam does not exceed 400ML in volume or 20ha in surface area
 4. there are no other evaporation or aggregation dams within a 50 km 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
 - 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
 - (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; and
 - (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; and
 - (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 banded so that the capacity and construction of the band 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 banded so that the capacity and construction of the band is sufficient to contain at least 25 per cent of the maximum design storage volume within the band.
- (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 place or commercial place.



Noise

(E2) In the event of a complaint about noise from the carrying out of the petroleum activity being made to the administering authority and that the administering authority considers is not frivolous nor vexatious nor based on mistaken belief, then the emission of noise from the licensed place must not result in levels greater than those specified in *Schedule E, Table 1—Noise limits for fixed activities* or *Schedule E, Table 2—Noise limits for itinerant activities as appropriate*.

(E3) In the event of a complaint about noise nuisance that the administering authority considers is not frivolous or vexatious then the holder of the environmental authority must prepare and submit a noise management plan to the administering authority within the reasonable and practicable timeframe specified in writing by the administering authority.

(E4) The noise management plan must address, but not be limited to, the following matters:

identification of component noise sources and activities at the place(s) which impact on noise sensitive areas;

- (a) the measured and/or predicted level of these noise sources and activities at noise sensitive places;
- (b) the reasonable and practicable control or abatement measures (including hours of operation) that can be undertaken to reduce identified intrusive noise sources;
- (c) the level of noise at noise sensitive places that would be achieved from implementing these measures.
- (d) the handling of future noise complaints;
- (e) community liaison and consultation; and
- (f) training of staff and contractors in noise management practices.

(E5) The holder of this environmental authority must commence implementation of the noise abatement 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.

Schedule E, Table 1—Noise limits for fixed activities

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
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

- 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.



Schedule E, Table 2—Noise Limits for itinerant activities

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

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

- 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.

(E6) The holder of this environmental authority, upon completion of the noise abatement recommendations contained in the noise management plan, 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 and/or Table 2.

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 %O₂ 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:
- under this environmental authority; or
 - under Section 186 of the *Petroleum and Gas (Production and Safety) Act 2004*; or
 - under Section 86 of the *Petroleum Act 1923*; or
 - under an approval of resource for beneficial use as provided for under the EP Act.
- (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:
- vegetation is not damaged
 - soil erosion and soil structure damage is avoided
 - there is no surface damming of the CSG water
 - minimises deep drainage below the root zone of any vegetation
 - quality of shallow aquifers is not adversely affected
 - 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*, or
- (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	(a) no subsidence or areas of major erosion for at least x years
			(b) Vegetation cover	(b) x% 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	(a) Certification that x% species diversity achieved and maintained for x years
			(b) Presence of key species	(b) Certification that key species present over a period of x years

SCHEDULE I—MONITORING PROGRAMS

General

- (I1) 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.



- (I2) All monitoring under this environmental authority must be conducted by a suitably qualified person.
- (I3) 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.
- (I4) 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.
- (I5) All determinations of water quality must be:
 - a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements; and
 - 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; and
 - 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.

- (I6) 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.
- (I7) 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 minimises environmental harm; and
 - (b) notify the administering authority of the condition or contaminant level and the actions taken to rectify it.
- (I8) 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.
- (I9) 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.
- (I10) 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; and
 - (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; and
 - (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

- (I11) The holder of this environmental authority must prepare and implement a groundwater monitoring program within 40 business days of this environmental authority taking effect.
- (I12) 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.
- (I13) 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; and
 - (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; and
 - (d) the development of procedures to establish background ground water quality.
- (I14) 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.
- (I15) 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; and
 - (c) the determination of groundwater flow direction, groundwater flow rate and hydraulic conductivity.
- (I16) 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.
- (I17) 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)

- (I18) 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

- (I19) 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

(I20) 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.

(I21) 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, 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.

(I22) 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)

(I23) 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.



- (I24) 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.
- (I25) 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; and
 - (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; and
 - (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; and
 - (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; and
 - (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; and
 - (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.

"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 per cent 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
 - 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; and
- 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.

"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.

“**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.

“**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**” means [to be defined through the noise consultation process].

“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; and
- 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; and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- 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 the DERM website 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
2. the consecutive samples are taken at approximately equal periods.



Appendix 3: Conditions that apply to the gas transmission pipeline

This appendix specifies the Coordinator-General's conditions that apply to the gas transmission pipeline. These conditions are additional to those specified in Appendix 1.

The conditions have been arranged as follows:

- Part 1 MCU for CICSDA and GSDA—recommended under section 35(4) of the SDPWO Act
- Part 2 General—imposed under section 54A and 54B of the SDPWO Act
- Part 3 Environmental—imposed under section 54A and 54B of the SDPWO Act
- Part 4 Environmental Authority—stated pursuant to sections 47B and 47C of the SDPWO Act.

Entities responsible for implementing conditions are specified in Appendix 5.

Part 1—MCU conditions for CICSDA and GSDA

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

The proponent is required to obtain an environmental authority approval from DERM prior to the commencement of construction.

Condition 3

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.

ADVICE

As part of the material change of use assessment process, the proponent shall provide an electronic copy of the proposed gas transmission pipeline alignment within the CICSDA and the GSDA.

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.

Part 2—General conditions

Condition 1

Temporary workers accommodation—location

Prior to construction, consultation with the relevant local government is to be undertaken to determine the appropriate location for all TWAFs. Consideration must be given to regional and local planning issues.

TWAFs shall not be constructed on land identified as Good Quality Agricultural Land Categories A and B, as described in State Planning Policy 1/92 where they are to remain in position for in excess of 5 years.

Condition 2

Temporary workers accommodation—building standards

All TWAFs must:

- allow for sufficient social and recreational opportunities;



- be constructed in a manner that provides a high quality living experience for residents, including providing adequate visual and acoustic privacy for residents;
- be constructed in a manner that complies with the Queensland Development Code (MP3.3); and
- be constructed in a manner that incorporates energy efficient design.

Condition 3

Temporary workers accommodation—sewerage systems

Prior to commencement of works, the appropriate methods for sewage treatment (in accordance with requirements of the relevant local government and DERM) are to be ascertained and implemented.

All sewage treatment systems associated with TWAFs must be located above Q50 flood levels for shorter term TWAFs and Q100 levels for longer term TWAFs. Longer term TWAFs are those facilities which are to be located in the one place for more than 5 years.

Condition 4

Temporary workers accommodation—flood levels

All TWAFs must be located above Q50 flood levels for shorter term TWAFs and Q100 levels for longer term TWAFs. Longer term TWAFs are those facilities which are to be located in the one place for more than 5 years.

Condition 5

Temporary workers accommodation—noise

All TWAFs must be constructed to meet the noise objectives at sensitive receptors set out in the following table:

Time	Noise objectives for indoors, measured at the receptor in dB(A)		
	LAeq,adj,1hr	LA10,adj,1hr	LA1,adj,1hr
Day and evening	35	40	45
Night	35	40	45

Condition 6

Waste disposal

Prior to commencement of works, the appropriate methods for disposal of waste (in accordance with requirements of the relevant local government and DERM) are to be ascertained and implemented.

Condition 7

Potable water

The proponent must ensure that all potable water consumed on the site and at TWAFs complies with the *Australian Drinking Water Guideline 2004*.

Condition 8

Council infrastructure upgrades

Prior to commencement of significant construction works the proponent must determine, from all relevant local governments, any upgrades to in sewerage or waste disposal facilities required as a result of the project's requirements. This includes servicing of workers' accommodation. The proponent must then meet the project's relative share of the costs associated with these upgrades.

Condition 9

Good quality agricultural land

The proponent must include provisions in the EM 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
- 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 10

Rail and power corridors

Prior to commencement of significant construction works, 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
- 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 11

Transport corridors

Prior to commencement of significant construction works, the proponent must:

- a) consult with the DTMR, 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 12

Mosquitoes

A mosquito and biting midge management plan must be developed as part of the gas pipeline EM Plan and include:

- assessment of work areas to identify potential breeding sites
- any required specific area control plans based on assessment of potential breeding sites must conform to DERM'S Mosquito Management Code of Practice for Queensland.

Queensland Health and relevant local councils must be contacted for assistance in choosing a suitable method.

Condition 13

Transport

The proponent must provide bus transportation services for the movement of large numbers of construction and operational workforce, resident in TWAFs, to and from project construction sites.

THE NARROWS

Condition 14

Bundled pipeline approach

Subject to Condition 15 construction of the pipeline across the across the Kangaroo Island wetlands and The Narrows must be undertaken concurrently with construction of the pipelines of other LNG proponents as part of a bundled pipeline construction methodology or as otherwise approved by the Coordinator-General.

Condition 15

Agreement among proponents

1. 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.
2. in the event that an agreement is not reached within a time set by the Coordinator-General 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 19 and 20 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 16

Route

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 17

Feasibility of incorporating utility services

An assessment of the feasibility of co-locating water, sewerage 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:

1. Gladstone and Area Water Board
2. Gladstone Regional Council
3. Telecommunication providers.

Condition 18

Consultation with agencies

The proponent must consult 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:

1. DERM
2. DEEDI
3. Gladstone Ports Corporation
4. Maritime Safety Queensland.

Condition 19

Information for Coordinator-General

Prior to issuing an environmental authority (pipeline licence) for the gas transmission pipeline segment across the Kangaroo Island wetlands and The Narrows, the following information shall be submitted to the Coordinator-General for 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, and
 - iv. the proposed bundled pipeline construction methodology.
- b) details of discussions with government departments and agencies in listed Condition 18 above and major issues unresolved



- c) an assessment of the environmental impacts of the construction and operation of the bundled pipeline and proposed mitigation strategies, and
- d) a draft environmental management plan (EM Plan) as detailed in Condition 20.

Condition 20

EM Plan for the Kangaroo Island wetlands and The Narrows pipeline segment

The draft EM plan must contain, but not necessarily be limited to:

1. 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.
2. The final pipeline route, design and construction methodology of the pipeline with specific detail on the crossing of Humpy and Targinie Creeks.
3. Geotechnical information to demonstrate that the engineered solution is technically feasible.
4. Acid sulfate soils data and analysis addressing the area within the proposed extension of the Gladstone State Development Area.
5. An acid sulfate soils management plan based on the final design and construction methodology of the bundled pipeline crossing.
6. Surface water and groundwater hydrological assessment of the Kangaroo Island wetland.
7. Water quality assessment of the Kangaroo Island wetlands and The Narrows.
8. 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.
9. Assessment of impacts on navigation and strategies to avoid or minimise these.
10. Cumulative impacts arising from dredging for The Narrows pipeline crossing and dredging for the Port of Gladstone Western Basin Dredging Project.
11. The draft EM plan should include details of proposed environmental offsets consistent with the Queensland Government Environmental Offset Policy 2008 and specific issue policies.

Condition 21

Issue of separate environmental authorities and pipeline licences

Environmental authorities under section 310M of the *EP Act* and pipeline licences under section 410 of the *P & G Act* 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, and
- c. Curtis Island.

Recommendation

Strategic Cropping Land

It is recommended that the proponent should have regard to the Strategic Cropping Land policy framework published in August 2010 by DERM when determining pipe line development locations.



Part 3—Environmental conditions

CONDITIONS THAT MUST BE MET PRIOR TO THE ISSUE OF ENVIRONMENTAL AUTHORITIES:

Condition 1

Draft EM Plan for gas transmission pipeline

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the Gas Transmission Pipeline must include but not be limited to:

- Aquatic values impacted by the Gas Transmission Pipeline, and in this regard:
A detailed assessment of aquatic values (including animal breeding places) 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 or wetland crossing and site specific mitigation measures to protect the values identified.

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:

- 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.

In addition, the design of all creek crossings and waterway barrier works should take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPI&F, July 2009).

- Protection of flora and fauna during construction and operation, including reduction or disruption to habitat. Particular mention should be made of any potential disruption to Koala or endangered species habitats.
- Scheduling of construction to protect the breeding and nesting seasons of the endangered Fitzroy and White Throated Snapping Turtles where applicable.
- Rehabilitation of disturbed riparian areas including use of locally sourced species and intensive planting.

The draft EM Plan covering the Kangaroo Island wetlands and The Narrows pipeline segment is to be submitted to the Coordinator-General for approval prior to the issue of an environmental authority

CONDITIONS THAT MUST BE MET PRIOR TO THE COMMENCEMENT OF PETROLEUM ACTIVITIES

Condition 2

Hydrostatic test water

The proponent must provide an assessment of the hydrostatic test water activities to be carried out under the environmental authorities for the gas transmission pipeline. The hydrostatic test water assessment must address, but not be limited to source water quality data and characteristics of additives, (particularly biocides) along with the proposed storage, treatment and disposal methods. The information should be used to determine the site specific mitigation measures including monitoring and reporting.

The hydrostatic test water assessment is to be submitted to DERM for review prior to the commencement of petroleum activities for the gas transmission pipeline.



Part 4—Environmental Authority conditions

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; and
 - b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - 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 2009* (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. The calculation of financial assurance must be calculated in accordance with the DERM 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 Schedule L—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 and which demonstrates compliance with the conditions of this environmental authority. Documentation relating to the EM plan must be kept.

- (A13) The EM plan required by condition (A13) must address, at least, the following:

- a) describe each of the following:
 - i. each relevant resource authority for the environmental authority;
 - ii. all relevant petroleum activities;
 - iii. the land on which the activities are to be carried out;
 - iv. the environmental values likely to be affected by the activities; and
 - v. the potential adverse and beneficial impacts of the activities on the environmental values.
- b) state the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
- c) include a rehabilitation program for land and waters proposed to be disturbed under each relevant resource authority for the application;
- d) state a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program;
- e) training of staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - i. 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;
 - ii. any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these;
 - iii. control procedures to be implemented for routine operations for day to day activities to minimise the likelihood of environmental harm, however occasioned or caused;
 - iv. 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);
 - v. organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues;
 - vi. effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management;
 - vii. obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals; and
 - viii. monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
- f) the conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually; and



- g) a program for continuous improvement.

Third Party Auditing

- (A14) 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:
 - a) every year during the construction of the pipeline; and
 - b) following commissioning of the pipeline.
- (A15) Within three (15) business days of receiving the final third party audit report, the holder of this authority must submit a copy to the administering authority.
- (A16) The third party auditor must certify the findings of the audit in the report.
- (A17) The financial cost of the third party audit is borne by the holder of this authority.
- (A18) 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.
- (A19) Subject to condition (A19), and not more than three (3) 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.

Cultural Heritage

- (A20) In the carrying out of the petroleum activities, the holder of this environmental authority must not adversely impact the cultural heritage values of any place registered on the Queensland Heritage Register.

SCHEDULE B—ENVIRONMENTAL NUISANCE

Odour, dust and airborne contaminants

- (B1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activities must not cause an environmental nuisance at any sensitive place or commercial place.
- (B2) Prior to the commencement of any petroleum activities that may generate dust at a sensitive place or commercial place, the holder of this authority must notify and consult with any potentially affected person.

Noise

- (B3) Prior to undertaking petroleum activities, including temporary workers accommodation, that are likely to impact upon a sensitive place or a 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 (B4).
- (B4) 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 activities or incorporate noise abatement and/attenuation measures to mitigate those impacts. These measures must be in place prior to undertaking the proposed petroleum activities.



- (B5) 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 B, Table 1—Noise limits when measured at the sensitive 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*, the most recent version of *AS 1055 Acoustics – Description and measurement of environmental noise*, the EPA guideline *Assessment of low frequency noise* and the EcoAccess guideline *Planning for noise control*.

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	Noise limits are to be finalised following compliance with the Coordinator-General's report and assessment of the EM Plan required under section 310D of the Environmental Protection Act 1994.					
L_{A10}, adj, 15 mins						
L_{A1}, adj, 15 mins						
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	Noise limits are to be finalised following compliance with the Coordinator-General's report and assessment of the EM Plan required under section 310D of the Environmental Protection Act 1994.					
L_{A10}, adj, 15 mins						
L_{A1}, adj, 15 mins						

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 for a limited period, at a sensitive or commercial place, then the requirements specified in Table B1, 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:
- the location of the sensitive or commercial place;
 - the names of the affected persons;
 - the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation); and
 - the period of the alternative arrangement(s).
 - details of the activities causing the noise, including the maximum noise levels expected at the noise sensitive receptor for the period defined in (d).

Blasting activities

- (B9) Prior to undertaking any blasting activities, the holder of this authority must notify any identified noise sensitive receptor of the proposed blasting activity. The notification must include:
- proposed location of blasting;
 - proposed time of blasting; and
 - noise levels expected at the sensitive receptor.



- (B10) 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 receptor.
- (B11) Noise from blasting operations must not exceed an airblast overpressure level, when measured at or extrapolated to any noise sensitive or commercial place, of 120 dB (linear peak) at any time.
- (B12) 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 5 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 surface waters

- (C1) The holder of this authority must not release contaminants to surface 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:
 - a) vegetation is not damaged;
 - b) soil erosion and soil structure damage is avoided;
 - c) the quality of groundwater is not adversely affected; and
 - d) there are no releases of trench water to any surface waters.
- (C4) The holder of this authority is not authorised to use untreated CSG water for dust suppression whilst undertaking petroleum activities authorised under this authority.

Coal seam gas water use for dust suppression

- (C5) 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 C, Table 1—Road dust suppression water contaminant release limits for each of the water quality characteristics.



Schedule C, 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
Sodium Adsorption Ratio (SAR)	ratio	15	maximum
Bicarbonate Ion Concentration	mg/L	100	maximum

- (C6) Dust suppression 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.
- (C7) Use of CSG water for dust suppression activities must be carried out in a manner that:
- vegetation is not damaged
 - soil erosion and soil structure damage is avoided
 - there is no surface damming of the CSG water
 - minimises deep drainage below the root zone of any vegetation
 - quality of shallow aquifers is not adversely affected
 - there are no releases of CSG waters to any surface waters.

Management of Hydrostatic Test Water

- (C8) The holder of this authority must develop a hydrostatic water management plan prior to the commencement of any hydrostatic water testing of the pipeline. The management plan must include but not be limited to the following:
- details of the impacts of hydrostatic test water activities along the pipeline route;
 - source water quality data and characteristics of additives (particularly biocides);
 - the proposed storage, treatment and disposal methods; and
 - site specific mitigation measures including monitoring and reporting.
- (C9) The hydrostatic water management plan must be submitted to DERM for review prior to the commencement of any hydrostatic testing of the pipeline.
- (C10) The holder of this authority must have due regard to any comments provided by the administering authority in finalising and implementing the hydrostatic test water management measures.
- (C11) The holder of this authority must ensure that:
- hydrostatic test water is not released to waters;
 - hydrostatic test water containing chemical additives is not released to land without written consent from the administering authority; and
 - hydrostatic test water released to land does not exceed the water quality limits specified in Schedule C, Table 1—Limits for the disposal of hydrostatic test water to land.

Note: Where contaminants contained in the hydrostatic test water are to be stored in a dam, an assessment against the latest version of the DERM Manual for assessing the hazard category and hydraulic performance of dams is required to determine the hazard level of the dam.



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 (µS/cm)	2000

- (C12) Any release of hydrostatic test water authorised by Condition (C11) must be located at least 100 metres from the nearest watercourse and carried out in a manner that ensures that:
- a) vegetation is not damaged;
 - b) soil erosion and soil structure damage is avoided; and
 - c) hydrotest water does not migrate outside the nominated land discharge areas.
- (C13) The holder of this authority must undertake hydrotesting of pipe sections crossing water bodies prior to installation of these pipe sections.

Determining water quality contaminants

- (C14) All determinations of the quality of contaminants released must be made in accordance with methods prescribed in the latest edition of the DERM Monitoring and Sampling Manual, 2009, and carried out on samples that are representative of the discharge.

Contaminant releases to groundwater

- (C15) The holder of this authority must not release contaminants to groundwater.

SCHEDULE D—WASTE MANAGEMENT

- (D1) The holder of this authority must develop and implement a waste management plan consistent with the *Environmental Protection (Waste) Policy 2000*.
- (D2) The waste management plan must address at least the following matters:
- a) the types and amounts of waste generated;
 - b) 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*);
 - c) procedures for dealing with accidents, spills and other incidents that may impact on waste management;
 - d) how often the performance of the waste management practices will be assessed (i.e. at least annually); and
 - e) the indicators or other criteria on which the performance of the waste management practices will be assessed.



- (D3) 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.
- (D4) 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.
- (D5) 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 spillages must not be cleaned up by hosing, or otherwise thereby releasing such waste or contaminants to any land or waters.
- (D6) 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.
- (D7) 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.
- (D8) 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:
 - a) date of waste transport;
 - b) quantity of waste removed and transported;
 - c) type of waste removed and transported;
 - d) route selected for transport of waste;
 - e) quantity of waste delivered; and
 - f) any incidents (e.g. spillage) that may have occurred on route.
- (D9) 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.

Sewage treatment and disposal works

- (D10) Any sewage treatment and disposal activities undertaken within the pipeline license area must be designed with a peak design capacity of 21 to 450 EP and must not exceed this peak design capacity.
- (D11) The sewage treatment activities must be designed to produce a Class C effluent standard using a disinfection process.

Release of treated sewage effluent contaminants to land

- (D12) Sewage pump stations must be fitted with a stand-by pump and a visible or audible high-level alarm.
- (D13) Any release to land authorised under this authority requires a buffer distance of at least 100 metres to any residential area, watercourse, wetland or protected area.
- (D14) Treated effluent may only be released to land at the designated, fenced and delineated contaminant release area/s.
- (D15) 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.
- (D16) 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.



- (D17) 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.
- (D18) All sewage sludge and sanitary bio-solids resulting from treatment is to be disposed at a licenced sewerage disposal facility.

Quality of contaminants released from the sewage treatment works

- (D19) Treated effluent must comply, at the sampling and in-situ measurement point(s), with each of the release limits specified in Schedule D, Table 1—Treated sewage effluent standards for each quality characteristic.
- (D20) The release of treated effluent to land must be monitored at the frequency and at the sampling and in-situ measurement point specified in Schedule D, 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 D, Table 1—Treated sewage effluent standards

Quality characteristic	Sampling unit	Sampling and in-situ measurement point location	Limit type	Release limit	Frequency
5-day Biochemical Oxygen Demand (inhibited)	mg/L	<i>To be finalised following assessment of the EM Plan required under section 310D of the Environmental Protection Act 1994.</i>	Median	20	Monthly
Suspended Solids	mg/L		Median	5	
Turbidity	NTU		Median (95 th %ile)	2	
			Maximum (95 th %ile)	5	
Total N	mg/L		50 th %ile	30	
			Maximum	45	
Total P	mg/L		Maximum	15	
TDS	mg/L		Median	<1000	
EC	µS/cm		Median	<1600	
pH	pH unit		Range	6-8.5	
<i>E. coli</i>	cfu/100ml	Maximum	<10		

SCHEDULE E—LAND AND WATERWAY MANAGEMENT

Minimising disturbance to land and soil management

- (E1) The holder of this authority must:
- a) limit the pipeline right of way width to a maximum of 40 metres except as otherwise authorised by the administering authority in writing;
 - b) minimise disturbance to land in order to prevent land degradation;
 - c) 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
 - i. stockpiled in a manner that will preserve its biological and chemical properties, and
 - ii. used for rehabilitation purposes in accordance with condition (E39).



- (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:
- a) the establishment of 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) the identification of baseline soil units at a scale of 1:100,000 for areas to be disturbed 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);
 - c) the development of 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 (>15 cm), sodic duplex soils; and
 - vi. non-sodic duplex soils.
 - d) assessment of the potential impacts of the petroleum activities with appropriate mitigation measures and construction methods applicable to the identified soil types or landforms
 - e) identification by ground truthing of all sensitive soil and landform areas along the pipeline corridor including Good Quality Agricultural Land and Strategic Cropping Land (as defined under the Government's *Protecting Queensland's strategic cropping land – A policy framework, August 2010*);
 - f) measures to protect and restore any Good Quality Agricultural Land;
 - g) a soils monitoring program outlining the parameters to be monitored, frequency of monitoring and maximum limits for each parameter
 - h) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activities
 - i) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.
- (E3) The holder of this authority must provide details of the soils management procedures to DERM for review prior to the commencement of construction of the pipeline.
- (E4) The holder of this authority must have due regard to any comments provided by the administering authority when implementing the soils management measures.
- (E5) 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 <5 m AHD) according to the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998*.



- (E6) 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 (E5).
- (E7) The holder of this authority must have due regard to any comments provided by the administering authority when implementing ASS management measures.

Good quality agricultural land

- (E8) On land with GQAL class A or B, the holder of this authority must bury the pipeline to at least 1.2 m below the finished land surface, or greater if deep ripping occurs as a normal farming practice.
- (E9) On land with GQAL class C1, the holder of this authority must bury the pipeline to at least 0.9 m below the finished land surface, or greater if deep ripping occurs as a normal farming practice.
- (E10) Upon completion of construction of the pipeline, on any land identified as being good quality agricultural land (GQAL), the holder of the authority must:
 - a) remove temporary access tracks, unless otherwise agreed in writing with the affected landholder;
 - b) lightly rip disturbed areas, replace topsoil and return the surface to a land use condition that serves the preconstruction use; and
 - c) implement and maintain land management and erosion control measures.

Erosion and sediment control plans

- (E11) 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.
- (E12) Appropriate measures to achieve compliance with Condition (E11) for the petroleum activities must be described in the EM plan and include:
 - a) diverting uncontaminated stormwater run-off around areas disturbed by pipeline activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 - b) collecting, treating, reusing or releasing contaminated stormwater runoff and incident rainfall 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) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
 - e) erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 - f) an inspection and maintenance program for the erosion and sediment control features; and
 - g) provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March; and
 - h) identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (E13) 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.



- (E14) 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.
- (E15) 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 waters, stormwater drainage system or roadside gutter.

Minimising disturbance to areas of ecological value

- (E16) Prior to conducting petroleum activities that involve significant disturbance to vegetation, 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.
- (E17) The assessment required by Condition (E16) 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*.
- (E18) 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 H4).
 - 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.
- (E19) Any vegetation clearing authorised under this authority must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.
- (E20) Remnant vegetation must not be cleared for the purposes of camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline.
- (E21) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.

Environmentally sensitive areas

- (E22) A maximum area of **<INSERT quantity>** hectares of vegetation may be cleared within the PPL **<INSERT PPL no.>** boundary for the pipeline right of way, receipt station, mainline valves and turnaround bays comprising:
 - a) Endangered Regional Ecosystems **<INSERT RE Type and quantity>**
 - b) Of Concern Regional Ecosystems **<INSERT RE Type and quantity>**
 - c) Not Of Concern Regional Ecosystems **<INSERT RE Type and quantity>**
- (E23) The holder of this authority must ensure that:
 - a) petroleum activities are not located in or within 200 metres of any listed category A ESA; and



- b) all camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline right of way and turnaround bays are not located in or within 200 metres of any listed category B or C ESA.

(E24) Activities may only 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*, the Queensland Parks and Wildlife Service.

Minimising disturbance to river and creek crossings

- (E25) All crossings must be in accordance with the construction methods described in the **<INSERT Document that details proposed water crossing construction methods for each water crossing>**.
- (E26) All investigation summaries, alignment sheets and specific crossing drawings for each creek and river crossing must be made available to the administering authority upon request.
- (E27) The construction of the pipeline must not be in or within 100 metres of any natural wetland, lake or spring.
- (E28) The design and construction of the pipeline, including all creek crossings and waterway barriers must:
 - a) minimise impacts on riparian, aquatic and water dependent flora and fauna;
 - b) protect flora and fauna during construction and operation, including reduction or disruption to habitat, particularly any potential disruption of endangered species habitat; and
 - c) rehabilitate disturbed riparian areas including use of locally sourced species and intensive planting.
- (E29) Pipeline and road construction works may be undertaken in watercourses, 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:
 - a) conducting work in times of no flow;
 - b) using all reasonable and practical measures to reduce impacts in times of flow; and
 - c) horizontal directional drilling may be used for the construction of the pipeline unless the construction occurs in times of no flow or an alternative construction methodology is agreed with the administering authority in writing.
- (E30) Activities or works resulting in significant disturbance to the bed or banks in accordance with Conditions (E30) and (E31) of a watercourse 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.



- (E31) 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 including works that divert the course of flow of the water or works that impound the water.
- (E32) 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.
- (E33) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse. If, due to the petroleum activities, water turbidity increases in the watercourse, outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (E34) 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

- (E35) 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.
- (E36) The holder of this authority must ensure that the pipeline right of way is reinstated to a maximum width of 12 metres once construction of the pipeline is completed.
- (E37) For areas of native vegetation, revegetation must use seed sourced from local provenance native species, where available.
- (E38) Rehabilitation of the pipeline corridor should 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.
- (E39) As soon as practicable and within three 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.
- (E40) 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 (E37);
 - 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.
- (E41) Notwithstanding Condition (E37), for any planned rehabilitation outcome that will not fulfil the rehabilitation requirements listed in Condition (E42), written agreement must be sought from the administering authority, prior to the rehabilitation being carried out.



- (E42) 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.
- (E43) 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 three years.

Pest and weed management

- (E44) 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;
 - c) measures to eliminate infestations of noxious pest and weed species that may occur.

Storage and handling of chemicals, flammable and combustible liquids

- (E45) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the relevant Australian Standards.
- (E46) 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*.
- (E47) 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.
- (E48) 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 a species management plan for all fauna, including all endangered, vulnerable or rare (EVR) listed species likely to be impacted by the pipeline activities. The plan must:
- a) address the impacts to the species; and
 - b) provide for the survival of the species in the wild.



(F2) 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. 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) minimising the clearing of mature and hollow-bearing trees;
- d) minimising the length of time the trench is open through the staging of activities;
- e) temporary exclusion fencing where practicable to restrict fauna access to the trench;
- f) the use of “night caps” over open pipe string ends to prevent the ingress of wildlife;
- g) pipes being strung with gaps to allow for fauna movement across the line of the pipe;
- h) 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;
- i) ensure any vertebrates 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;
- j) installation of ramps and trench plugs with a slope less than 50 per cent at least every 1,000 metres to assist fauna to leave the trench; and
- 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 250 metres.

(F3) A copy of the fauna management procedures must be made available to the administering authority on request.

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.

SCHEDULE G—DECLARED WILD RIVER AREAS—No conditions

SCHEDULE H—PROJECT INFRASTRUCTURE

(H1) The pipeline corridor must be built within the locations outlined in Schedule H, Table 1—Location of the PPL <INSERT PPL no.> pipeline corridor.

Schedule H, Table 1—Location of the PPL <INSERT PPL no.> pipeline corridor

Pipeline licence no.	Location (KP)	Easting (MGA Zone 56)	Northing (MGA Zone 56)
PPL <INSERT PPL no.>			

(H2) All petroleum infrastructure must be removed from the relevant petroleum authority prior to the surrender of this 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 authority must decommission the pipeline to a situation where ongoing, or potential environmental harm is prevented or minimised. As a minimum, the 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; and
 - d) all areas disturbed by above ground infrastructure are rehabilitated in accordance with the requirements of this authority.

SCHEDULE I—MONITORING PROGRAMS

- (I1) The holder of this authority must:
 - a) develop and implement a monitoring program that will demonstrate compliance with the conditions in this authority; and
 - b) document the monitoring and inspections carried out under the program and any actions taken.
- (I2) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conduct all monitoring required by this authority.
- (I3) The holder of this authority must record, compile and keep for a minimum of five 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 must be kept until the relevant petroleum tenure is surrendered.
- (I4) 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 authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results; and
 - b) an evaluation/explanation of the data from any monitoring programs; and
 - 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; and
 - 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

Managing complaints

- (J1) 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.
- (J2) If the administering authority is not satisfied with the proposed or completed action, the holder must undertake monitoring or other actions requested by the administering authority.
- (J3) Maintain a record of complaints and incidents causing environmental nuisance or environmental harm, and actions taken in response to the complaint or incident.



- (J4) Retain the record of complaints required by this condition for five (5) years.

Complaint response

- (J5) 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; and
 - e) any actions taken.

SCHEDULE K—NOTIFICATION PROCEDURES

Notification of emergencies and incidents

- (K1) The holder of this authority must telephone the DERM's Pollution Hotline (1300 130 372) and any affected landholder or occupier on the day of 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) of the following volumes or kind:
- a) releases of any volume to water;
 - b) releases of volume greater than 200 L to land; and
 - 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 (K1 and K2) 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.
- (K4) 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 (K3) 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.
- (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.
- (K6) A record of incidents must be maintained to include a record of all incidents occurring in the previous 5 years.



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.

"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 per cent 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 40,000 mg/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*, and adopted for the purpose of the *Vegetation Management Act 1999*;
- 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; and
- 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.

“**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.

“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.

“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 25 cm deep or soils less than 25 cm 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.

“**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 $L_{PZ,15 \text{ min}}$** ” 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.



“ppt” means parts per thousand.

“**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; and
- 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, and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- 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, or
 - 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 300 mm 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.



Appendix 4: Conditions that apply to the LNG facility

This appendix specifies the Coordinator-General's conditions that apply to the LNG facility. These conditions are additional to those specified in Appendix 1.

The conditions have been arranged as follows:

- Part 1 MCU for GSDA—recommended under section 35(4) of the SDPWO Act
- Part 2 General—imposed under section 54A and 54B of the SDPWO Act
- Part 3 Environmental—imposed under section 54A and 54B of the SDPWO Act
- Part 4 Environmental Authority—stated pursuant to sections 47B and 47C of the SDPWO Act

Entities responsible for implementing conditions are specified in Appendix 5.

Part 1—MCU conditions for GSDA

Condition 1

Minimise the visual impact of the construction and operation of the LNG facility by:

- a) Appropriately locating the LNG facility within the site footprint
- b) the colour scheme of the LNG facility and buildings, other than the LNG storage tanks and corrosion protected structures and pipe insulation, is selected from the palette of predominant colours found in the locality to minimise the visual intrusion of the structures except where health and safety requirements dictate colours
- c) ensuring site works will minimise tree clearing with stabilisation and rehabilitation works on disturbed areas, which is to be fully implemented within twelve months of commencement of operation of Train 1 of the LNG facility, or Train 2, if constructed, and
- d) maintaining the integrity of the sites land and navigational safety systems, minimising light spill and avoiding direct views of lights from outside the LNG facility boundary.

Condition 2

The proponent must ensure that all potable water consumed on site and at workers accommodation complies with the *Australian Drinking Water Guideline 2004*.

Condition 3

Within 3 months of the final investment decision to proceed, 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 4

Unless otherwise approved in writing by the Coordinator-General, the proponent and its construction contractors workers must not bring private motor vehicles or water craft, onto the LNG facility site. Where approval has been issued a copy of that approval must be kept within the vehicle at all times for inspection by authorities.



CONSTRUCTION WORKFORCE ACCOMMODATION

Condition 5

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.

Advice

Based on the information provided to date, by APLNG and other LNG proponents, a TWAf of 1500 single person compartments is acceptable.

The Coordinator-General is, however, prepared to consider a TWAf size in excess of this figure as part of the 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
- d. justification for the proposed timeframe for use of the land.

Condition 6

All TWAfs must:

- allow for sufficient social and recreational opportunities;
- be constructed in a manner that provides a high quality living experience for residents, including providing adequate visual and acoustic privacy for residents;
- be constructed in a manner that complies with the Queensland Development Code (MP3.3); and
- be constructed in a manner that incorporates energy efficient design.

Condition 7

The proponent must implement appropriate methods for sewage treatment in accordance with requirements of Gladstone Regional Council and DERM prior to commencement of works.

Condition 8

The proponent must implement appropriate methods for disposal of waste in accordance with requirements of Gladstone Regional Council and DERM prior to commencement of works

Condition 9

Unless otherwise approved in writing by the Coordinator-General, decommissioning of the TWAf shall be undertaken in accordance with a decommissioning plan prepared by APLNG and approved by the Coordinator-General. The decommissioning plan, or updates to the decommissioning plan, must be submitted to the Coordinator-General for approval at least six months prior to commissioning of Train 1. The decommissioning plan must contain an updated project schedule detailing the construction timetable for subsequent Trains up to four Trains in total as described in the EIS. The Coordinator-General may require the decommissioning, or mothballing, of the TWAf if the proponent's construction schedule for subsequent Trains is delayed significantly from the timing outlined in the EIS.



OPERATIONAL WORKFORCE ACCOMMODATION

Condition 10

Accommodation for any operational workforce or emergency purposes within the LNG facility site shall utilise permanent buildings.

Condition 11

Buildings to accommodate any operational workforce are to be located on the LNG facility site.

Condition 12

Accommodation for any operational workforce must not preclude or inhibit industrial development (including related infrastructure) within the CIIP of the GSDA.

Condition 13

Accommodation for any operational workforce shall not exceed 115 single compartments and be contained within the footprint of the approved TWAF.

Condition 14

Any operational workforce accommodation must be decommissioned as part of the LNG plant decommissioning.

RELATED IMPACTS

Condition 15

The TWAF and any 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)		
	L _{Aeq,adj,1hr}	L _{A10,adj,1hr}	L _{A1,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.
3. 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 the for GSDA.



Part 2—General conditions

These conditions are imposed by the Coordinator-General under section 54A and 54B of the SDPWO Act

Condition 1

- a) 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.
- b) 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 vapour; 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 as per NFPA 59A
- 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*, except if the Act requires more stringent criteria.

Condition 3

Within 3 months of the final investment decision to proceed, prepare waste management plans for the construction, and 3 months prior to commissioning of Train 1, for the operations of the LNG facility and include them in the respective Environmental Management Plan. 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 4

APLNG shall prepare an Environmental Management Precinct Exclusion Management Plan for the approval of the Coordinator-General which sets out the areas to be excluded from access by vehicle or foot by the 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 Precinct 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 1971*.

Condition 5

Prior to commencement of significant construction works the proponent must determine, from Gladstone Regional Council, any upgrades to sewage or waste disposal facilities required as a result of the project's requirements. This includes servicing of workers' accommodation. The proponent must then meet the project's relative share of the costs associated with these upgrades.

Condition 6

The currency of this report will lapse four years after it is released unless it is extended pursuant to section 35A of the *SDPWO Act*. In the event that APLNG has not received material change of use approval for Trains 3 and 4 within four years of the date of this report, then the Coordinator-General is prepared to extend the currency period of this report for a further two years provided that APLNG informs the Coordinator-General within the currency period, that it has decided to proceed with construction of a subsequent train/s and provides satisfactory supporting documentation.

Condition 7

Acid sulphate soils

1. The EM Plan developed in accordance with section 310D of the EP Act to support the application for the EA for the LNG Facility, must provide to the administering authority, an assessment of acid sulphate soils within the location of landing facilities and the LNG export facilities on Curtis Island, in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* (QASSIT).
2. The proponent must provide an acid sulfate soils investigation report and site-specific acid sulfate soils management plans for the proposal detailing management strategies in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002*. This is needed as part of an application for a development permit for tidal works and before any site works are commenced.

Condition 8

Fluid Wastes

The EM Plan developed in accordance with section 310D of the EP Act to support the application for the EA for the LNG Facility must include:

- detailed information on all chemical inputs to effluent streams proposed to be discharged at Curtis island;
- details on how these may change over time.

RECOMMENDATION

Dredging in tidal waters for ancilliary marine facilities

It is recommended that the administering agency set the same conditions for the ancillary infrastructure dredging as that specified for the WBDDP.



Part 3—Environmental conditions

These conditions are **imposed** by the Coordinator-General under section 54A and 54B of the SDPWO Act

ENVIRONMENTAL CONDITIONS TO BE MET PRIOR TO COMMENCEMENT OF PETROLEUM ACTIVITIES

Condition 1

Construction Environmental Management Plan (CEMP)

The EM Plan developed in accordance with section 310D of the EP Act to support the application for the EA for the LNG Facility must include a Construction Environmental Management Plan that provides detailed information about the construction activities to be carried out under the environmental authority for the LNG facility. The CEMP must address, but not be limited to:

1. design plans showing the extent of the works proposed;
2. a construction schedule and methodology, including plans and maps showing discharge points and emission controls for initial construction stages with periodic updates to provide plans and maps showing discharge points and emission controls for subsequent stages;
3. environmental monitoring and a sampling program which details baseline data collection and provides the basis for ongoing monitoring of specified parameters for the period the works, including appropriate triggers for mitigation and cessation of works;
4. any potential impacts or effects of the proposed works upon the environment and the means by which adverse impacts will be avoided or mitigated;
5. details on the sewage treatment plant and desalination plant, including:
 - (a) design and operational performance information for sewage treatment and desalination.
 - (b) 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.
 - (c) 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.
 - (d) eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
 - (e) adequacy of modelling to predict dimensions and duration of mixing zone.
6. eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
7. adequacy of modelling to predict dimensions and duration of mixing zone.
8. details on other plant, equipment or activities that involve emissions to the environment, including:
 - (a) a description of the plant, equipment or activities; and
 - (b) design and operational performance information for plant, equipment or activities.
9. engineering design drawings for operational works in the intertidal area for the materials off-load facility, jetties and wharves;
10. detailed list of waste streams including their handling, treatment and disposal arrangements;
11. 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;
12. a rehabilitation program for land proposed to be disturbed during construction of all petroleum infrastructure (including associated accommodation and recreation activities) on Curtis Island;



13. 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;
14. details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on the environment from the works.

Condition 2 Operations Environmental Management Plan (OEMP)

Prior to the commissioning of Train 1, the proponent must provide an operations environmental management plan (OEMP) that provides detailed information about the activities to be carried out under the environmental authority related to the commissioning and operation of the LNG Facility. The OEMP must address, but not be limited to:

1. Identification of all environmentally relevant activities conducted in the petroleum tenure and other approvals required for this component of the project to proceed
2. 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.
3. Sewage treatment plant and desalination plant information for the operational life of the LNG facility, including:
 - (a) a proposal for treated sewage to be discharged to land which includes wet weather storage;
 - (b) design and operational performance information for sewage treatment and desalination;
 - (c) 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.
 - (d) 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.
 - (e) A risk assessment approach to eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
 - (f) Adequacy of modelling to predict dimensions and duration of mixing zone.

RECOMMENDATION

Desalination and sewage effluent discharge modelling

The EM Plan submitted in support of the environmental authority for the LNG Facility should predict the estimated salinity concentrations at the point of contact with the sea bed under the various scenarios through an evidenced based assessment of the discharge to Port Curtis.

Part 4—Environmental authority conditions

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; and
 - b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - 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.

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 ; and
 - (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; and
 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; and
 - (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; and
 7. A program for continuous improvement.
- (A11) The EM Plan must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this approval.
- (A12) 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

- (A13) 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.
- (A14) Within 15 business days of receiving the final third party audit report, the holder of this authority must submit a copy to the administering authority.
- (A15) The third party auditor must certify the findings of the audit in the report.
- (A16) The financial cost of the third party audit is borne by the holder of this authority.
- (A17) 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.



(A18) Subject to condition (A13), and not more than three (3) 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

(A19) 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”.

(A20) 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

(A21) 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.

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 impedence 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

Determination Required	Release Point Numbers	Frequency
<i>To be finalised through assessment of EM Plan required by 310D of the Environmental Protection Act 1994</i>		



SCHEDULE B, TABLE 2 – CONTAMINANT RELEASE LIMITS TO AIR

Release point number	Minimum release height (metres)	Minimum velocity (m/sec)	Contaminant release	Maximum release limit ¹
<i>To be finalised through assessment of EM Plan required by 310D of the Environmental Protection Act 1994</i>				

- (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% under varied gas flow rate and meteorological conditions and meet the best practice design standards (e.g. NSW EPA: Protection of the Environment 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, other than during LNG train start-up.
- (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:
- implementation of a monitoring program to regularly leak test all units/components including pumps, piping and controls, vessels and tanks; and
 - 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 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:
- Reverse Osmosis Concentrate (ROC) via the diffuser discharge point DF1 to Port Curtis, refer plan <INSERT Plan>; and
 - Treated sewage effluent via the diffuser discharge point DF1 to Port Curtis during the construction of train 1 and train 2, refer plan <INSERT Plan>; and
 - 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 <INSERT Plan>;
 - Uncontaminated stormwater from the LNG Facility site via the Stormwater Discharge Point SW1 to Port Curtis, refer plan <INSERT Plan>.
- (C2) The release of contaminants directly or indirectly to waters:
- must not produce any visible discolouration of receiving waters; nor
 - 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 th percentile compliance	Weekly (composite sample ²)
	5-day Biochemical Oxygen Demand	35 mg/L	maximum	Weekly (composite sample ²)



Monitoring Point	Quality Characteristics	Release Limit	Limit Type	Minimum Monitoring Frequency
	Suspended Solids	<5 mg/L	80 th 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 th percentile compliance	Weekly (composite sample ²)
	Total - N	10 mg/L	maximum	Weekly (composite sample ²)
	Total -P	0.1 mg/L	50 th percentile compliance	Weekly (composite sample ²)
	Total - P	1 mg/L	maximum	Weekly (composite sample ²)
	Ammonia -N	1 mg/L	50 th percentile compliance	Weekly (composite sample ²)
	Ammonia - N	3 mg/L	maximum	Weekly (composite sample ²)
	Dissolved Oxygen	4 mg/L	minimum	Online continuous

¹ Monitoring point S1 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.

Quality Characteristics of Release to Waters

- (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 <INSERT Quantity> megalitres.
- (C6) The ROC released via the diffuser discharge point DF1 must not exceed the release limits specified in Table 1 when measured at the monitoring point S1 described as the Discharge Monitoring Point (N<INSERT> E<INSERT>), refer plan <INSERT Plan> 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)	20 mg/L	Maximum	
	Turbidity	5 NTU	Long term 50th percentile	Daily (single measurement)
		15 NTU	Maximum	
pH	6.5 to 8.5	Range		

¹ Monitoring point S2 described as the Discharge Monitoring Point (N<INSERT >E<INSERT Plan>), refer plan <INSERT Plan> 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 95th protection levels for toxicant should be added here		Maximum	Weekly

¹ Monitoring point S2 described as the Discharge Monitoring Point (N<INSERT >E<INSERT Plan>), refer plan <INSERT Plan> 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.



- (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% 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 **<INSERT Percentage appropriate to 1m or smaller chronic zone>**% concentration i.e. the LOEC must only be observed at a dilution greater than **<INSERT Dilution appropriate to 1m or smaller chronic zone>**.
- (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; and
 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 (E<INSERT> N<INSERT>), refer plan <INSERT Plan> 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 & 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 & 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



& 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; and
 - (c) Characterisation of the ROC waste stream, including potential toxicants present; and
 - (d) The nature of the contaminant(s); and
 - (e) Acute and chronic DTA testing conducted on end-of-pipe ROC discharged; and
 - (f) Test/biological end points; and
 - (g) DTA end-points (including NOEC and LOEC); and
 - (h) Quality assurance/quality control; and
 - (i) Applicable Toxicity Identification Evaluation (TIE) procedures to be followed should the administering authority require such an evaluation; and
 - (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, and
 - (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; and



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%, 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%, 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%, 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.



Receiving Environment Monitoring Program (REMP)

- (C31) A REMP must be developed and implemented, based on the surface water quality management plan in condition (C1), 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 Port Curtis and connected waterways. The REMP should address 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 3 months prior to the commencement of discharge to Port Curtis.



Stormwater Management Plan

- (C35) A Stormwater Management Plan must be prepared for the site prior to, and implemented during construction and operation. The Stormwater Management Plan must address at least the following:
- (a) the location of discharge points;
 - (b) prevention of incident storm water and storm water run-off from contacting wastes or contaminants;
 - (c) 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
 - (d) collection, treatment and disposal of all contaminated storm water run-off.
- (C36) The holder of the environmental authority must submit the stormwater management plan required by Condition (C34), to the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.
- (C37) The stormwater management plan must be reviewed and updated annually.

Maintenance of Stormwater Management Devices

- (C38) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering the LNG facility footprint.
- (C39) 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.
- (C40) Detention basins must be of a sufficient capacity to contain the runoff expected from a 24 hour storm with an average recurrence interval of 1 in 10 years.
- (C41) The release of contaminants from the stormwater discharge points to waters must comply, at the sampling and in situ monitoring point(s) specified in Schedule C, Table 4 - *Stormwater Release Limits*, with each of the limits specified in Schedule C Table 4 - *Stormwater Release Limits* for each quality characteristic.

Monitoring

- (C42) Monitoring of stormwater 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 Schedule C, Table 4.



SCHEDULE C, TABLE 4 – STORMWATER RELEASE LIMITS

Release Point	Monitoring Point	Quality Characteristics	Limit	Limit Type	Minimum Monitoring Frequency
Limits for Construction					
Prescribed in Stormwater Management Plan	Prescribed in Stormwater Management Plan	Temperature	BG ± 2°C	Range	Prior to discharge and daily during discharge events.
		pH	6.5 - 8.5	Range	
		Total Suspended Solids	50 mg/L	Maximum	
		Total hydrocarbons	10 mg/L and no visible sheen, oil or objectionable material	Maximum	
		Dissolved Oxygen	4 mg/L	Minimum	<ul style="list-style-type: none"> • Quarterly • Prior to discharge; and • During first day of discharge; and Periods of no discharge must be recorded.
		Cadmium	5.5 *µg/L	Maximum	
		Chromium (Cr III)	27.4 *µg/L	Maximum	
		Chromium (Cr IV)	4.4 *µg/L	Maximum	
		Cobalt	1 *µg/L	Maximum	
		Copper	1.3 *µg/L	Maximum	
		Lead	4.4 *µg/L	Maximum	
		Mercury (inorganic)	0.4 *µg/L	Maximum	
		Nickel	70 *µg/L	Maximum	
		Silver	1.4 *µg/L	Maximum	
		Tributyltin	0.006 *µg/L	Maximum	
		Vanadium	100 *µg/L	Maximum	
Zinc	15 *µg/L	Maximum			
Limits for Operational Plant					
Prescribed in Stormwater Management Plan	Prescribed in Stormwater Management Plan	Temperature	BG ± 2°C	Range	Prior to discharge and daily during discharge events.
		pH	6.5 - 8.5	Range	
		Total Suspended Solids	15 mg/L	Maximum	
		Total hydrocarbons	10 mg/L and no visible sheen, oil or objectionable material	Maximum	
		Dissolved Oxygen	4 mg/L	Minimum	<ul style="list-style-type: none"> • Quarterly • Prior to discharge; and • During first day of discharge; and Periods of no discharge must be recorded.
		Cadmium	5.5 *µg/L	Maximum	
		Chromium (Cr III)	27.4 *µg/L	Maximum	
		Chromium (Cr IV)	4.4 *µg/L	Maximum	
		Cobalt	1 *µg/L	Maximum	
		Copper	1.3 *µg/L	Maximum	
		Lead	4.4 *µg/L	Maximum	
		Mercury (inorganic)	0.4 *µg/L	Maximum	
		Nickel	70 *µg/L	Maximum	
		Silver	1.4 *µg/L	Maximum	
		Tributyltin	0.006 *µg/L	Maximum	
		Vanadium	100 *µg/L	Maximum	
Zinc	15 *µg/L	Maximum			



Dissolved Fraction

Release to Land

Permitted Contaminant Release and Discharge Point(s)

- (C43) The only contaminant(s) permitted to be released directly or indirectly to land from the petroleum activities are the following releases:
1. Treated sewage effluent via the discharge point L1 prescribed in the Wastewater Irrigation Management Plan required by condition (C52).

Quality Characteristics (Treated Sewage Effluent)

- (C44) 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 C, Table 5 - *Release Quality Characteristic (Discharge to Land)* with each of the limits specified in Schedule C, Table 5 – *Release Quality Characteristic (Discharge to Land)* for each quality characteristic.
- (C45) Notwithstanding the quality characteristic limits specified in Schedule C, Table 5 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 C, TABLE 5 - RELEASE QUALITY CHARACTERISTIC (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

- (C46) 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.
- (C47) Any treated effluent irrigation area must, not be used for:
- (a) recreational activities or as a traffic thoroughfare during irrigation; and



- (b) 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.

Wastewater Release Control

- (C48) Treated sewage effluent must not be irrigated when weather or soil conditions would cause run-off or ponding of any wastewater irrigated.
- (C49) 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.
- (C50) 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.

Supply of Treated Effluent for the Purpose of Irrigation

- (C51) 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 C, Table 5 - *Release Quality Characteristic for (Discharge to Land)* for each quality characteristic.
- (C52) 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 Irrigation Management Plan

- (C53) The holder of this environmental authority must prepare a Wastewater Irrigation Management Plan, where wastewater is proposed to be discharged to land. The Wastewater Irrigation Management Plan is to be developed in accordance with the “*Queensland Water Recycling Guidelines, 2005*” produced by the Environmental Protection Agency or the “*Draft National Guidelines for Sewerage Systems: Reclaimed Water*” endorsed by NH&MRC 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.



- (C54) 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.

Other Applications of Wastewater (Sewage Effluent) to Land

- (C55) The holder of this authority must develop and implement a Wastewater Re-use Management Plan for proposed uses of sewage effluent water other than irrigation prescribed under the Wastewater Irrigation Management Plan. The plan must:
- (a) provide a description of the proposed use/s of the wastewater; and
 - (b) be developed in accordance with the “Queensland Water Recycling Guidelines, 2005” produced by the Environmental Protection Agency or the “Draft National Guidelines for Sewerage Systems: Reclaimed Water” endorsed by NH&MRC in 2000;
 - (c) present sufficient water quality data to demonstrate:
 - i. the water is fit for the intended purpose/s; and
 - ii. the water presents no risk to the environment or to public health.
- (C56) Prior to the reuse of wastewater the holder of this environmental authority must lodge a copy of the Wastewater Re-use Management Plan with the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.

Release to Land

Permitted Contaminant Release and Discharge Point(s)

- (C57) The only contaminant(s) permitted to be released directly or indirectly to land from the petroleum activities are treated sewage effluent via the discharge point L1 to <insert designated area>, refer plan XXXX.

Quality Characteristics (Treated Sewage Effluent)

- (C58) 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.
- (C59) 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 C, TABLE 6 - 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

- (C60) 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.
- (C61) Any treated effluent irrigation area must, not be used for:
 - (a) recreational activities or as a traffic thoroughfare during irrigation; and
 - (b) 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

- (C62) Sufficient wet weather storage should be provided for a 3 month period.

Wastewater Release Control

- (C63) 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
- (C64) Treated sewage effluent must not be irrigated when weather or soil conditions would cause run-off or ponding of any wastewater irrigated.
- (C65) 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.
- (C66) 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

- (C67) 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

- (C68) 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.
- (C69) 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

- (C70) 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 NH&MRC 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.
- (C71) 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.

Contaminant Releases to Groundwater

- (C72) There must be no release of contaminants to groundwater.

Over Water Abrasive Blasting and Surface Coating

- (C73) Where abrasive blasting or surface coating activities are to be carried out over water, on land below the highest astronomical tide or on land subject to 1:10 year flood regime, the holder of this authority must carry out the activity in accordance with the requirements and procedures outlined in the following DERM guidelines to prevent the release of contaminants to waters:



- (a) Over-water abrasive blasting in marine and other aquatic environments; (guideline) and
- (b) Over-water abrasive blasting – environmental risk assessment (information sheet).

SCHEDULE D – NOISE MANAGEMENT

- (D1) Noise from the construction or operation of 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) the location (and relevant noise limits) prescribed in Schedule D - Table 1, that is closest to the sensitive place or commercial place that will be used to determine compliance with Condition (D1);
 - (b) a determination of:
 - a. $L_{AMax, adj, 15 mins}$ for construction noise at the sensitive place or commercial place; or,
 - b. $L_{Aeq, 15 mins}$ for the LNG plant noise (operational) at the sensitive place or commercial place
 - (c) A 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;
 - (d) the level and frequency of occurrence of impulsive or tonal noise;
 - (e) taking measurements of the low frequency noise below 200 Hz;
 - (f) atmospheric conditions including temperature, wind speed and direction; and
 - (g) 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 construction activities or 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.
- (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.



SCHEDULE D, TABLE 1 – NOISE COMPONENT LIMITS FOR THE LNG PLANT

Location	Gladstone city	Fisherma ns Road	Passage area (Tide Island)	South End	Targinie area
Construction Noise Criteria dB(A), (L_{AMax}, adj, 15 mins)					
Monday - Friday	7am – 6pm	<i>To be finalised following assessment of the EM Plan required by 310D of the Environmental Protection Act 1994</i>			
	6pm – 10pm				
	10pm – 7am				
Saturday	7am – 12pm				
	12pm – 6pm				
	6pm – 7am				
Sunday/ Public Holidays	7am – 6 pm				
	6pm – 7am				
NOTE: (-) Means no criteria apply during this time period					
Operations Noise Criteria dB(A) (L_{Aeq}, 1 hour)					
Monday – Sunday / Public Holidays	7am – 6pm	<i>To be finalised following assessment of the EM Plan required by 310D of the Environmental Protection Act 1994</i>			
	6pm – 10pm				
	10pm – 7am				

Low Frequency Noise

- (D6) Notwithstanding condition (D1) and the limits specified in Schedule D, Table 1, emission of any noise below 200 Hz must not cause an environmental nuisance.
- (D7) Low frequency noise from the LNG plant is NOT considered to be a nuisance under condition (D6) if monitoring shows that noise emissions do not exceed the following limits:
- (a) 50 dB(Z) measured inside the noise sensitive place or commercial place; and
 - (b) the difference between the internal A-weighted and Z-weighted noise levels is no greater than 15dB.

SCHEDULE E – WASTE MANAGEMENT

- (E1) 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.
- (E2) 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.
- (E3) 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.



- (E4) 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.
- (E5) 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.
- (E6) 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; and
 - (e) any incidents (e.g. spillage) that may have occurred en route.
- (E7) Regulated waste is not permitted to be disposed on site, including untreated septic waste, untreated 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; and
 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:
 - (a) 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; and
 - (b) an Acid Sulfate Soil Management Plan (ASSMP), implemented over the full period of construction, and for a period after completion of construction as defined by the ASSMP, for land above the mean high water springs tide; and
 - (c) Acid Sulfate Soil Management Plans (ASSMP), implemented over the full period of construction, and for a period after completion of construction as defined by the ASSMP for works below the mean high water springs tide.
- (F8) The holder of the environmental authority must submit the Acid Sulfate Soil Management Plans required by condition (F7), to the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.
- (F9) 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

- (F10) Pest and weed species must be managed to prevent their growth and proliferation.

Land Disturbance

- (F11) The holder of this 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;



- (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.

Vegetation Clearing

- (F12) A total maximum area of XXXX hectares of vegetation can be cleared within the boundary of PFXXXX, comprising: **<INSERT Specific disturbance>**
- (F13) Cleared vegetation is not authorised to be burnt on-site.

Management Of Fauna

- (F14) The holder of this authority must develop and implement a species management plan for affected endangered, vulnerable and rare listed species (both terrestrial and marine) for PFL11 including, construction, operation and decommissioning phases. The plan shall be developed to:
 - (a) address the impacts to the species;
 - (b) provide for the survival of the species in the wild; and
 - (c) achieve a net conservation benefit for the species.
- (F15) A suitably qualified, licensed and experienced fauna spotter will be present during the vegetation clearing activities to relocate fauna prior to clearing and recover any injured fauna.
- (F16) The holder of this authority must ensure any protected 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 the administering authority must be notified within 24 hours of any injuries or deaths.
- (F17) Unless required for the safe construction and operation of the LNG Plant, 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; and
 - (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% of a single storage tank or 100% of the largest storage tank plus 10% 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% 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; and
 - (b) document the monitoring and inspections carried out under the program and any actions taken.
- (I2) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conducts all monitoring required by this authority.
- (I3) 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.
- (I4) 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.
- (I5) 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; and
 - (b) an evaluation/explanation of the data from any monitoring programs; and
 - (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; and



- (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; and
 - (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) on the day of 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) The holder of this authority is required to report on the day of becoming aware of, in the case of uncontained spills (including hydrocarbon, contaminated water or mixtures of both), 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; and
- (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; and
 - (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; and
 - (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.

End of Conditions

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.

"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 per cent 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; and
- 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.

“**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:

- (d) that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater; and
- (e) identified by an assessment process consistent with the document: Salinity Management Handbook, Queensland Department of Natural Resources, 1997; or
- (f) identified by an approved salinity hazard map held by the Department of Environment and Resource Management.

“**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.

“**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**” means [to be defined through the noise consultation process].

“**lake**” means:

(c) a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
(d) 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 $L_{PZ,15 \text{ min}}$ 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:

- (d) declared under the *Land Protection (Pest and Stock route Management) Act 2002*;
- (e) declared under Local Government model local laws; and
- (f) which may become invasive in the future.

“**ppt**” means parts per thousand.

“**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; and
- 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; and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- 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:

- (g) in a natural channel, whether artificially improved or not; or
- (h) in an artificial channel that has changed the course of the watercourse; but, in any case, only:
 - (i) 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
 - (j) 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
 - (k) if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit; or
 - (l) 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.



Appendix 5: Jurisdiction table for conditions

Appendix	Approval	Condition number	Agency for jurisdiction
1—Part 1	CG imposed conditions—General	1, 2, 4, 5, 6, 7,8,	DERM
		2.	DIP, (Significant Projects Coordination Compliance Unit)
		10	DERM, Relevant regional and local governmentil
		9	DEEDI
		11	QPS, DCS, QH Relevant regional and local government
1—Part 2	CG Imposed Conditions—Traffic and Transport	1–5, 7, 9, 13,	DTMR
	Marine traffic	6	DTMR, GPC
		8	CG
	Impact on local roads	10	Relevant regional and local Councils,
		11	DTMR, QPS
	Airport upgrade	12	WDRRC
		14	QPS
	Gas flares	15, 16	CASA
1—Part 3	CG Imposed Conditions—SIMP, consultation, RCCCs	1, 2A, 3A, 3B, 4A	DIP—Social Impact Assessment Unit
	Employment and training programs	2B	DEEDI
	Housing	4B, 4C, 4D	DoC
Appendix 2—Part 1	CG Imposed Conditions—Gas field: TWAF	1–9	WDRRC
	Rural residential impact management	10	DIP—Social Impact Assessment Unit
2—Part 2	Environmental Conditions—Gas Fields	1–9, 12–26	DERM
	Groundwater monitoring	10, 11	CG, QWC
2—Part 3	Model conditions	All	DERM
Appendix 3—Part 1	MCU—Gas transmission Pipeline	All	DIP—State Development Areas
3—Part 2	Coordinator-General imposed conditions-gas pipeline TWAF	1–8, 13	Relevant regional and local government
	Good quality agricultural land	9	DERM
	Mosquito and biting midge	12	DERM, Relevant regional and local council
	Infrastructure corridors	10, 11	QR, Powerlink
	The Narrows concurrent construction of pipelines	14–19	CG
	EM Plan for wetlands	20, 21	DERM
3—Part 3	Coordinator-General imposed environmental conditions	1,2	DERM
3—Part 4	Environmental Authority—Gas Pipeline	All	DERM



Appendix 4—Part 1	MCU LNG Facility	All	DIP—State Development Areas
4—Part 2	CG Imposed Conditions—LNG Facility	1, 2, 4	JAG
	Waste management plans	3	DERM
	GRC sewerage upgrade requirements	5	GRC
	Currency of approval	6	DIP—State Development Areas
	Acid sulfate soils, fluid wastes	7, 8	DERM
4—Part 3	CG Imposed Environmental Conditions—LNG Facility	All	DIP—Significant Projects Coordination Compliance Unit
4—Part 4	Environmental Authority—LNG Facility	All	DERM



Appendix 6: Proponent commitments

Commitments—gas fields

Stakeholder engagement

APLNG will:

- Continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the project
- Continue to participate with government in local and regional planning processes and provide timely information about the project to inform discussion and decision making
- Continue to work to mitigate project impacts on local landowners throughout the project life by:
- Engaging with each landowner within the project area prior to any project activity on their land
- Where possible, working towards mutually beneficial outcomes
- Assigning a dedicated liaison officer to each landowner in the project area
- Locating and scheduling project activities to reduce impacts on landowner activities.

Climate

In order to manage potential impacts of climate and climate change associated with the gas fields (and associated infrastructure), APLNG will:

- Incorporate adaptive management approach to climate change throughout the life of the project
- Incorporate the agreed preferred climate change strategies which resulted from the risk assessment into the design process
- Co-operate with government, other industry and other sectors to address adaptation to climate change.

Geology and soils

APLNG commits to the following for the construction, operation, and decommissioning of the project within the gas fields:

- Avoid areas of severe erosion potential where practicable
- Minimise erosion risk by refining construction techniques, and erosion and sediment control methods
- Creek rehabilitation will be consistent with surrounding environment and contours of the channel at the time of construction
- Point discharges will be directed to stable waterways and/or drainage lines with appropriate engineering controls, such as scour protection and flow velocity limits
- Develop and implement procedures and monitoring programs to identify, investigate and conduct necessary remedial works for potential site contamination to retain environmental values.

Land use and planning

To minimise adverse impacts to existing or future land uses from its activities in the gas fields' development areas, APLNG will:

- Minimise the loss of good quality agricultural land
- Undertake ongoing assessments and update good quality agricultural land mapping so potential impacts can be mitigated
- Participate in pro-active weed management and will work with regional councils to construct weed wash down facilities near Miles to support gas field construction and operations
- Prepare and implement property-specific plans to manage project activities around the landholder business and residences to minimise impacts
- Implement the adaptive associated water management plan, which includes the opportunity for impacted landholders to beneficially use water.



Landscape and visual amenity

To manage the potential visual impacts associated with the construction and operation of the gas fields, APLNG will, where practicable:

- Complete a detailed analysis of the visual catchment of each gas processing facility located within 1,000m, each water treatment facility within 400m, and each gas well within 300m from the nearest sensitive receptors, and where required, implement (in consultation with the land holder) strategies to screen or integrate the gas processing facility, water treatment facility or gas well into the landscape
- Undertake a detailed analysis of the visual catchment of each accommodation facility to establish if there are any sensitive receptors within 800m of the facility. Where needed, establish and implement vegetation planting strategies to screen or integrate the accommodation facility into the landscape
- Consider colours of infrastructure to minimise the contrast with the surrounding landscape
- Remove surface infrastructure, where no longer required, during decommissioning and rehabilitate to a condition as close to its original state as possible.

Terrestrial ecology

APLNG commits to utilising sensitivity mapping and landscape management guidelines to plan the location of infrastructure, taking into account the landscape biodiversity values with the aim of minimising habitat fragmentation.

APLNG will limit clearing in areas of high biodiversity value, particularly for:

- Category 1 areas—these areas will be avoided and protected with 'no go' zones and a buffer area established in accordance with the approved habitat management guidelines
- Categories 2 and 3 areas—unless otherwise approved, all activity on undisturbed land in these areas will follow the approved habitat management guidelines, infrastructure will be positioned along existing disturbed areas, and active rehabilitation will be implemented.

APLNG will establish a vegetation offset program that includes:

- Developing offsets for each hectare of conservation significant vegetation removed for the project
- Considering ecological values at a regional scale when identifying locations for compensatory offset
- Targeting offsets to enhance biodiversity corridors where practical
- Using a third party provider to manage delivery of the regional program, supplemented with contributions to an administered fund
- Developing and providing offsets to respond to a disturbance inventory.

APLNG will engage with government and the community to develop sustainable regional land use strategies that combine the interests of gas production, agriculture and biodiversity values.

APLNG will undertake the following weed management measures:

- Develop weed management guidelines to minimise the spread of weeds throughout the study area and eradicate and control new weed infestations
- Work with regional councils in weed control
- Construct weed wash down facilities near Miles to support gas field construction and operations.

Aquatic ecology

To manage the potential impacts on water quality, aquatic ecology and habitat and fluvial geomorphology associated with the construction, operation and decommissioning of the proposed gas field infrastructure, APLNG will:

- Develop and implement water quality, aquatic ecology and geomorphology monitoring programs for treated water discharge
- Locate discharge points within geomorphologically stable reaches of watercourses
- Design and implement erosion and sediment control devices according to regulatory requirements (Queensland 'Guidelines for Erosion and Sediment Control')



- Develop and implement mosquito monitoring and mitigation in accordance with the Mosquito Management Code of Practice for Queensland, for ponded waters associated with petroleum development.
- Design discharges to watercourses to mimic the variability of natural flows to the best extent practicable, and meet regulatory requirements (recognising the practicalities and timing of establishing beneficial use)
- Design watercourse crossings to not impede flow and therefore the passage of organisms.

Groundwater

APLNG makes the following ongoing commitments as part of its groundwater mitigation and management strategy:

- Continue to assess impacts from associated water extractions over the life of the project
- Collaborate with the Queensland Government in support of its Blueprint for Queensland's LNG Industry (2009), and other CSG operators in the region, to develop an agreed approach to regional groundwater monitoring and cumulative effects groundwater modelling
- Work with government to develop a publically accessible database which will contain easily interpreted groundwater level and quality monitoring data
- Manage and implement appropriate (early intervention) strategies to minimise adverse impacts as a consequence of its proposed CSG activities
- Comply with the 'make good' provisions where required under the *Petroleum and Gas (Production and Safety) Act 2004* and consult with stakeholders on strategies to 'make good'
- Involve community groups in the implementation of the ongoing groundwater monitoring program
- As part of the ongoing monitoring program, conduct further evaluations of the potential for gas migration during CSG production and, where necessary, develop appropriate monitoring and control measures to mitigate any residual risks
- Employ CSG well and infrastructure designs and construction methods, in accordance with relevant legislation and standards agreed in consultation with government, which minimise the potential for impacts to the local and regional groundwater regime
- Actively investigate alternative water management strategies including aquifer injection
- Participate in studies into the long-term sustainable water supply options for the region and support programs for water conservation within the region.

Surface water

To manage potential impacts of tenement flooding, APLNG will:

- Avoid placement of major infrastructure in existing flood extents where practicable
- Avoid placement of project infrastructure over tributaries and flow paths where practicable
- Incorporate appropriate design measures where infrastructure is located within flood extents (such as wellhead facilities).
- To manage potential impacts to water quality, APLNG will install and maintain stormwater mitigation devices to reduce the potential impacts of storm events on the facilities and receiving environment.

To manage potential impacts of treated water discharge to stream flow, APLNG will:

- Discharge in a manner that meets environmental flow objectives and mimics pre-development stream flows where practicable (recognising the practicalities and timing of establishing beneficial use)
- Design discharge infrastructure such that localised velocity and scour is minimised and appropriate mixing of discharge is achieved
- Conduct ongoing monitoring for water quality at selected locations of the gas fields where significant project activity is undertaken during operations.
- To manage potential impacts of hydro-test water, APLNG will:
- Test the quality of the hydro-test water prior to release
- Discharge hydro-test water in compliance with all regulatory requirements and consult landholders about opportunities for reuse.
- To manage potential impacts of dam failure, APLNG will:
- Design project surface water storage systems to appropriate standards, and relevant conditions and to minimise the potential for impact on residences
- Incorporate appropriate mitigation measures if there is potential risk to property.



Associated water management

APLNG is committed to collaborating with the Queensland Government in support of its Blueprint for Queensland's LNG Industry (2009), and other CSG operators in the region, to develop an agreed approach to regional groundwater monitoring and cumulative effects groundwater modelling.

As part of the ongoing monitoring program, APLNG will conduct further evaluations of the potential for impacts from agricultural and stream discharge and, where necessary, develop appropriate monitoring and control measures to mitigate any residual risks.

When implementing re-use management options, such as agricultural, APLNG will adopt sustainable land management practices, including appropriate irrigation techniques and stormwater and erosion control measures.

APLNG will:

- Treat water to the appropriate quality for disposal or re-use option
- Discharge treated water in a manner that meets environmental flow objectives and mimics pre-development stream flows where practicable (recognising the practicalities and timing of establishing beneficial use)
- Minimise the number and size of ponds and line all associated water and brine ponds
- Optimise commercial and beneficial water use through an adaptive approach including:
 - water which can be reliably supplied long term will be contracted to commercial customers
 - investigate opportunities for water to be managed in conjunction with other producers including water aggregation
- Consider the use of associated water (either treated or untreated) to meet the forecast water requirements of the project during field development and operation
- Continue to work with the Western Downs Regional Council to study options to make water available to Miles and the towns near the gas field development
- Participate in studies into the long-term sustainable water supply options for the region and support programs for water conservation within the region
- Offer impacted landholders, near to its water pipeline network, the opportunity to access water on commercial terms or as a compensation offset, subject to availability and relevant approvals
- Actively investigate alternative water management technologies including aquifer injection
- Actively investigate improved water management technologies to address beneficial use of brine.

Air quality

To manage the potential impacts of air emissions associated with the construction, operation and decommissioning of the gas fields and to meet air quality objectives, APLNG will:

- Conduct further investigations into technologies or options as part of development at Condabri and/or an expansion of the Talinga facilities and implement accordingly to meet air quality criteria
- Minimise dust emissions through the implementation of measures incorporated in environmental management plans that include, as far as practicable, minimising the area and duration of land disturbance activities, scheduling such activities to avoid adverse weather conditions, suppressing dust, and rehabilitating disturbed areas as soon as practicable
- Use lean-burn gas-fired engines (lower oxides of nitrogen) wherever practicable
- Develop and implement an air emission monitoring program for nitrogen dioxide, including installation of stack emission testing equipment in gas processing facilities
- Investigate alternative low emission technologies as appropriate, including electric drive motors.

Greenhouse gases

APLNG will:

- Develop ongoing processes for minimising energy consumption and greenhouse gas (GHG) emissions within the project, by:
 - Investigating the use of solar and electric drives for production equipment
 - Improving the energy efficiency of gas compression through better technology



- Minimising operational coal seam gas flaring and venting
- Develop a biodiversity offset strategy, which will take into account GHG offsets
- Measure and report GHG emissions in compliance with National Greenhouse and Energy Reporting System
- Work with government on developing measures to address GHG emissions.

Noise and vibration

In order to manage potential impacts of airborne noise and ground vibration during gas well-development and plant and other infrastructure construction, APLNG will:

- Identify noise management measures for out-of-hours (6.30pm to 6.30am) construction activities within 2km of dwellings, if required, in consultation with potentially affected residents
- Develop and implement construction noise and vibration management measures on a case by case basis for potentially affected residents, as appropriate
- Orientate wellhead flare lines away from the nearest sensitive receptors, wherever possible
- Schedule and identify noise management measures for cavitation activities in consultation with potentially affected residents
- Locate gas and water pipelines at appropriate distances from sensitive dwellings, commercial premises or cultural heritage listed structures to minimise the risk of harm from ground vibration associated with construction activities
- Design blasting to comply with the relevant criteria
- Identify suitable routes and times of travel prior to well development and plant construction to reduce disturbances to residents and traffic conditions
- Encourage deliveries to construction sites during normal operating hours where practicable
- Locate accommodation facilities at appropriate distances from sensitive receptors.

APLNG will address the planning noise level for residences or otherwise reach agreements with affected landowners to manage potential impacts of airborne noise during normal operations by:

- Planning gas well and gas processing facility locations and designing noise mitigation treatments for all plant to achieve compliance with the planning noise level for all operating equipment at noise sensitive receptors
- Designing the orientation of gas processing facilities and constructing noise attenuation walls to minimise directional noise emissions to nearest sensitive receptors, as required
- Utilising lower noise cooling fans for compressor engines at gas processing facilities, as required
- Incorporating noise controls into water treatment facilities
- Investigating the alternative of electric drive motors instead of gas-fired engines for gas processing facilities, water treatment facilities, and wellheads.

Waste

APLNG will:

- Develop and implement detailed waste management guidelines across the gas fields utilising the principles of the waste management hierarchy
- Work with local councils to determine the current landfill capacities and accepted waste types and will work with councils to assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the project can be accommodated if required
- Establish contracts with companies encouraging sustainable waste management practices
- Encourage the procurement of pre-fabricated materials where practicable
- Encourage local businesses to take advantage of opportunities for re-use and recycling, if available or initiate opportunities, if unavailable
- Regularly review of the waste management guidelines including the marketability of wastes and the results of waste audits to improve waste management within the gas fields.

Traffic and transport

To reduce the risk of accidents to employees and other transport network users from project operations, APLNG will develop and implement detailed traffic management plans and transport and logistics management plans for constructing and operating the gas fields. These plans will incorporate safety measures to be implemented across all relevant modes of transport.



A range of operational health and safety measures covering the operation of project vehicles will be implemented to reduce the risk of motor vehicle accidents. APLNG will adopt Origin's health, safety and environment (HSE) management system for the operation of the gas fields.

APLNG will:

- Rehabilitate, post construction, impacted stock routes
- Work with the Australian, Queensland and local governments and industry in regard to infrastructure alterations which may be required to meet the increased demands on the regional and local transport network which may include access road construction, flood mitigation measures, intersection and road modifications, pavement rehabilitation and road maintenance
- Decommission access roads to temporary facilities, laydown areas and stockpile sites that have been constructed as part of the project, unless relevant government agencies or landowners agree with APLNG to leave them in place
- Implement measures to reduce, as far as practicable, the generation of dust by project vehicles
- Participate in pro-active weed management and will work closely with regional councils
- Work with Western Downs Regional Council and relevant government agencies and service providers to determine the most appropriate options for the use of Miles aerodrome
- Support Maranoa Regional Council's applications for government funding to upgrade the Roma airport.

Indigenous cultural heritage

APLNG commits to continued engagement and negotiations with endorsed Aboriginal Parties and to developing (where not already developed) and implementing an approved cultural heritage management plan for the gas fields' area.

APLNG is seeking to develop long-term relationships with Aboriginal parties and broader Indigenous communities through implementing an Indigenous engagement strategy.

Non-indigenous cultural heritage

APLNG commits to avoiding adverse impact on non-indigenous (shared) cultural heritage where practicable, and where unable to avoid impacts, develop a heritage management plan in consultation with relevant regulatory bodies.

Social assessment

Employment and business

APLNG will:

- Continue to use existing methods or develop new methods to attract people to the workforce who are local to the region, as well as those from under-represented groups
- Implement a local content strategy, to participate in or establish programs to assist qualified local and regional businesses with tendering opportunities for providing goods and services for the project
- Aim to build collaborative partnerships with government and community organisations, to enhance the capacity for employers to provide jobs and for local people to develop skills and obtain employment (e.g. through the Community Skills Scholarship program)
- Work with government, the community and industry to plan for potential cumulative impacts and to share information about potential impacts and mitigation measures
- Ensure contracts with suppliers and contractors are aligned with APLNG's sustainability principles and objectives
- Work closely with EnergySkills Queensland's CSG/LNG Skills Taskforce to help meet the growing skills demand by:
 - Creating community awareness about the industry and opportunities
 - Enhancing vocational training



- Facilitating career advice and work readiness programs for new entrants and mature entrants from related industries.

Stakeholder engagement and consultation

Refer to stakeholder engagement commitments detailed in Appendix 6.

Education and training

APLNG will:

- implement CSG/LNG gateway programs with high schools in the region, in partnership with providers such as the Queensland Minerals and Energy Academy, to promote career opportunities and facilitate employment in the CSG/LNG industry
- expand competency based training and skills development programs for production and process plant operators, including further development of the dedicated training facilities at the Peat gas processing facility near Wandoan
- continue to collaborate on programs with government, training and educational groups that build the local skills base, to meet the specific needs of the industry and other impacted sectors including ongoing development of apprenticeship, traineeship, scholarship and higher education programs.

Community health and safety

APLNG will:

- expand its community safety awareness program in conjunction with industry partners, government and community groups, to develop responses to project-related community safety issues in the region
- communicate and strictly enforce its code of conduct for all staff and contractors, to uphold a high standard of behaviour
- collaborate with government, industry and other providers to mitigate the impact on health services in local communities, including providing the appropriate level of medical facilities for operating plants and accommodation facilities.

Local services and facilities commitments

APLNG will:

- collaborate on research programs with government, industry and community partners to understand social impacts and opportunities the development creates in the communities in which it operates
- implement community investment programs to support sustainable community development.

Housing and accommodation commitments

APLNG will:

- provide temporary accommodation facilities for non-local construction staff and contractors, and consult with stakeholders during the site selection process for these facilities
- mitigate pressure on housing affordability during gas fields operations, temporary accommodation will be provided for personnel wishing to relocate until such time as housing stock becomes available
- work through committees established under the Queensland Government's Sustainable Resource Communities Policy to identify housing market issues, forecasts and possible responses
- mitigate potential impacts on housing affordability and availability, through community programs that involve working with government and agencies that provide housing to people in distress.

Economic assessment

To manage potential impacts of the project on the local and regional economic environments, APLNG has committed to a range of strategies. The economic commitments for these strategies are contained within the social commitments on page 342.



Hazard and risk

In order to minimise the potential risk to people property and the environment from abnormal events or accidents associated with its gas fields activities, including from exposure to natural hazards, APLNG will:

- operate the gas field under a formal safety management plan in accordance with the requirements of the *Petroleum and Gas (Production and Safety) Act 2004*, to be updated as required during operations
- maintain an up to date traffic management plan which will include: driver fatigue monitoring, driver education and training, enforced speed limits for project vehicles, use of buses to reduce private vehicle use, public access restrictions to work areas; and use of in-vehicle monitoring systems
- initiate and participate in ongoing community campaigns to reduce the likelihood and consequences of vehicle accidents
- consult with Civil Aviation Safety Authority and the Western Downs Regional Council on plans for the proposed gas processing facility near Miles aerodrome.

Matters of national environmental significance

To manage potential impacts on matters of national environmental significance from activities within the gas fields, APLNG has committed to a range of strategies, as described for terrestrial and aquatic ecology on page 333 of this report.

Commitments—gas pipeline

Stakeholder engagement

APLNG will:

- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the project
- continue to participate with government in local and regional planning processes and provide timely information about the project to inform discussion and decision-making
- continue to work to mitigate project impacts on local landowners throughout the project life by:
 - engaging with each landowner within the project area prior to any project activity on their land
 - where possible, working towards mutually beneficial outcomes
 - assigning a dedicated liaison officer to each landowner in the project area
 - locating and scheduling project activities to reduce impacts on landowner activities.

Climate

In order to manage potential impacts of climate and climate change associated with the gas pipeline, APLNG will:

- incorporate adaptive management approach to climate change throughout the life of the project
- incorporate the agreed preferred climate change strategies which resulted from the risk assessment into the design process
- cooperate with government, other industry and other sectors to address adaptation to climate change.

Geology and soils

APLNG commits to the following for the construction, operation, and decommissioning of the project within the gas pipeline corridor:

- minimise erosion risk by refining construction techniques, and erosion and sediment control methods
- creek rehabilitation will be consistent with surrounding environment and contours of the channel at the time of construction
- direct point discharges to stable waterways and/or drainage lines with appropriate engineering controls, such as scour protection and flow velocity limits



- complete an acid sulfate soils investigation and develop an acid sulfate soils management plan in accordance with relevant Queensland guidelines
- develop and implement procedures and monitoring programs to identify, investigate and conduct necessary remedial works for potential site contamination to retain environmental values.

Land use and planning

To minimise adverse impacts to existing or future land uses from its activities related to the gas pipeline, APLNG will:

- work with affected landholders to limit disruption to the landholder's use of the land for agricultural and other purposes
- participate in proactive weed management and will work with regional councils to construct weed wash down facilities at a location in the Banana Shire to support gas pipeline construction and operations
- consult with the operators and owners of infrastructure such as roads, railways, marine facilities, other pipelines and telecommunication cables to develop management measures for the crossing of, or co-location with, such infrastructure.

Landscape and visual amenity

To manage the potential visual impacts associated with the construction and operation of the gas pipeline, APLNG will, where practicable:

- minimise the construction time within the visible areas of sensitive receptors
- minimise clearing of forest and woodland cover particularly in the vicinity of sensitive receptors
- undertake detailed analysis of the visual catchment of each accommodation facility to establish if there are any sensitive receptors within 800m of the facility. Where required, strategies will be implemented to minimise impacts, in consultation with the landholder.
- rehabilitate disturbed areas to be consistent with surrounding area
- where sight lines are important in forest areas, re-establish cover (within operational and safety bounds) to diminish the contrast between the adjoining forest and the easement
- properly fell trees and clear easements to minimise impact on adjoining vegetation.

Terrestrial ecology

To manage potential impacts on terrestrial ecology associated with the construction, operation and decommissioning of the gas pipeline, APLNG will:

- conduct surveys for large-fruited zamia palm and Pedley's wattle along the Callide Range (KP 255-271) and Calliope Range (KP 281.5-282.1), and for shiny-leaf ironbark and other endangered, vulnerable or rare plants (i.e. threatened, as listed under State legislation) in the central section of the route (KP 90-105) and develop strategies to reduce impacts
- limit vegetation clearing to the minimum practicable extent along the right of way
- undertake pre-clearing surveys to identify the presence of endangered, vulnerable or rare and other significant flora and fauna species where they are likely to occur. Where populations are identified, the gas pipeline route will be realigned or the right of way narrowed for short distances, where safe, to reduce damage or loss of these populations
- develop and implement bio-security management measures for weeds and pest animals
- work with regional councils in weed control and contribute to the construction of a permanent weed washdown facility in the Banana Shire
- develop a vegetation offsets program in consultation with the Queensland Department of Environment and Resource Management and the Commonwealth Department of Environment, Water, Heritage and the Arts.

Aquatic ecology

To manage the potential impacts on water quality, aquatic ecology and habitat and fluvial geomorphology associated with the construction, operation and decommissioning of the proposed gas pipeline infrastructure, APLNG will:

- design and implement erosion and sediment control devices according to regulatory requirements (Queensland 'Guidelines for Erosion and Sediment Control')



- design watercourse crossings to not impede flow and therefore the passage of organisms.

Marine ecology

APLNG is committed to managing the potential impacts that constructing the gas pipeline may have on the marine environment, particularly when constructing the gas pipeline crossing of The Narrows.

APLNG will:

- develop a construction methodology that will minimise disturbance
- work with State Government, Gladstone Ports Corporation and other proponents proposing similar crossings to achieve an outcome that minimises cumulative impacts
- establish a process for visual observations and recording of dugongs and cetaceans.
- if horizontal directional drilling (HDD) is not the adopted construction method, APLNG will select an appropriate plan to construct a pipeline trench across The Narrows. All dredging activities will be in accordance with dredge management procedures, to reduce potential impact to the watercourse and marine flora and fauna.

Water resources

APLNG will:

- undertake works, where practicable, in watercourses when the channels is dry
- undertake, where practicable, any post-construction remedial works of waterway crossings prior to the onset of the wet season
- undertake annual post-construction monitoring of waterway crossing sites at the end of the wet season, until it has been established that the construction works were successfully completed
- implement water efficiency measures for construction activities which require the use of surface or groundwater
- be as self-sufficient as practical for all construction and operational water requirements
- require all major contractors to submit water conservation plans.

To manage potential impacts of hydrotest water, APLNG will:

- test the quality of the hydrotest water prior to release
- discharge hydrotest water in compliance with all regulatory requirements and consult landholders about opportunities for reuse.

Coastal environment

APLNG's commitments to maintaining the existing values of the coastal environment of The Narrows are addressed in the Marine Ecology section above (refer page 335).

Air quality

To manage the potential impacts of air emissions associated with the construction of the gas pipeline and to meet air quality objectives, APLNG will minimise dust emissions through the following measures:

- minimise the area and duration of land disturbance activities as far as practicable
- schedule land disturbance activities with recognition of potentially adverse weather conditions
- reduce speed limits on unpaved roads and tracks adjacent to dwellings to reduce dust
- suppress dust formation where required with water or other suitable means
- rehabilitate disturbed areas as soon as practicable.

Greenhouse gases

APLNG will:

- develop ongoing processes for minimising energy consumption and GHG emissions
- develop and implement a leak detection and repair program.



Noise and vibration

To manage potential impacts of airborne noise and ground vibration associated with construction of the gas pipeline, APLNG will:

- locate the gas pipeline at least 100m from sensitive dwellings, commercial premises or cultural heritage listed structures to minimise the risk of cosmetic or structural damage
- schedule non-standard trenching operations such as rock-sawing, rock-hammering or directional-drilling during standard daytime working hours and notify residents or businesses within 200m before any of these activities are conducted
- limit construction activities near dwellings to between 6.30am and 6.30pm, as far as practicable
- undertake out-of-hours construction activities (for example, drilling) in accordance with a noise management plan that addresses the *Environmental Protection (Noise) Policy 2008* acoustic quality objectives
- locate temporary accommodation facilities at least 500m from sensitive receptors
- prepare a traffic management plan prior to construction to identify suitable routes and times of travel to minimise disturbances to residents and traffic conditions.

Waste

APLNG will:

- develop and implement detailed waste management guidelines for the gas pipeline utilising the principles of the waste management hierarchy
- consult with local councils to determine current landfill capacities and accepted waste types, and should insufficient capacity be identified, APLNG will provide councils with information to assist in planning the expansion and upgrade of their landfills to ensure waste generated from the project can be accommodated
- establish contracts with companies encouraging sustainable waste management practices
- encourage local businesses to establish recycling facilities within the region to maximise the opportunities for re-use and recycling
- regular review of the waste management guidelines including the marketability of wastes and the results of waste audits to improve waste management for the gas pipeline.

Traffic and transport

To reduce the risk of accidents to employees and other transport network users from project operations, APLNG will develop and implement detailed traffic management plans and transport and logistics management plans for constructing and operating the gas pipeline. These plans will incorporate safety measures to be implemented across all relevant modes of transport.

A range of operational health and safety measures covering the operation of project vehicles will be in place to reduce the risk of motor vehicle accidents. APLNG will adopt Origin's HSE management system for the operations of the gas pipeline.

APLNG will:

- rehabilitate, post construction, impacted stock routes
- work with Federal, State, and local governments and industry in regard to infrastructure alterations which may be required to meet the increased demands on the regional and local transport network which may include access road construction, flood mitigation measures, intersection and road modifications, pavement rehabilitation and road maintenance
- decommission access roads to temporary facilities, laydown areas and stockpile sites that have been constructed as part of the project, unless relevant government agencies or landowners agree with APLNG to leave them in place
- implement measures to reduce, as far as practicable, the generation of dust by project vehicles
- participate in pro-active weed management and will work closely with regional Councils
- minimise impacts to existing road and rail infrastructure crossings through the use of construction techniques such as boring.



Indigenous cultural heritage

APLNG commits to continued engagement and negotiations with endorsed Aboriginal parties and to developing (where not already developed) and implementing an approved cultural heritage management plan for the gas pipeline.

APLNG is seeking to develop long-term relationships with Aboriginal parties and broader Indigenous communities through implementing an Indigenous engagement strategy.

Non-indigenous cultural heritage

APLNG commits to avoiding adverse impact on non-Indigenous cultural heritage where practicable, and where unable to avoid impacts, develop a heritage management plan in consultation with relevant regulatory bodies.

Social assessment

Employment and business

APLNG will:

- continue to use existing methods or develop new methods to attract people to the workforce who are local to the region, as well as those from under-represented groups
- implement a local content strategy, to participate in or establish programs to assist qualified local and regional businesses with tendering opportunities for providing goods and services for the project
- aim to build collaborative partnerships with government and community organisations, to enhance the capacity for employers to provide jobs and for local people to develop skills and obtain employment (e.g. through the Community Skills Scholarship program)
- continue to use existing methods or develop new methods to attract under-represented groups to the workforce.
- work with government, the community and industry to plan for potential cumulative impacts and to share information about potential impacts and mitigation measures
- ensure contracts with suppliers and contractors are aligned with APLNG's sustainability principles and objectives
- work closely with EnergySkills Queensland's CSG/LNG Skills Taskforce to help meet the growing skills demand by:
 - creating community awareness about the industry and opportunities
 - enhancing vocational training
 - facilitating career advice and work readiness programs for new entrants and mature entrants from related industries.

Stakeholder engagement and consultation

Refer to stakeholder engagement commitments detailed above.

Education and training

APLNG will:

- implement CSG/LNG gateway programs with high schools in the region, in partnership with providers such as the Queensland Minerals and Energy Academy, to promote career opportunities and facilitate employment in the CSG/LNG industry
- continue to collaborate on programs with government, training and educational groups that build the local skills base, to meet the specific needs of the industry and other impacted sectors. This includes ongoing development of apprenticeship, traineeship, scholarship and higher education programs.



Community health and safety

APLNG will:

- expand its community safety awareness program in conjunction with industry partners, government and community groups, to develop responses to project-related community safety issues in the region
- communicate and strictly enforce its code of conduct for all staff and contractors, to uphold a high standard of behaviour
- collaborate with government, industry and other providers to mitigate the impact on health services in local communities, including providing the appropriate level of medical facilities for operating plants and accommodation facilities.

Local services and facilities commitments

APLNG will:

- collaborate on research programs with government, industry and community partners to understand social impacts and opportunities the development creates in the communities in which we operate
- implement community investment programs to support sustainable community development.

Housing and accommodation commitments

APLNG will:

- provide temporary accommodation facilities for non-local construction staff and contractors, and consult with stakeholders during the site selection process for these facilities
- mitigate pressure on housing affordability during operations, temporary accommodation will be provided for personnel wishing to relocate until such time as housing stock becomes available
- work through committees established under the Queensland Government's Sustainable Resource Communities Policy to identify housing market issues, forecasts and possible responses
- mitigate potential impacts on housing affordability and availability, through community programs that involve working with government and agencies that provide housing to people in distress.

Economic assessment

To manage potential impacts of the project on the local and regional economic environments, APLNG has committed to a range of strategies. The economic commitments for these strategies are contained within the social commitments above.

Hazard and risk

In order to minimise the potential risk to people, property and the environment of abnormal events, natural hazards or accidents associated with construction and operation of the gas pipeline, APLNG will:

- operate the gas pipeline under a formal safety management plan, which considers whole-of-life safety management in accordance with the requirements of the *Petroleum and Gas (Production and Safety) Act 2004*, to be updated as required during operations
- maintain an up to date traffic management plan which will include driver fatigue monitoring, driver education and training, enforced speed limits for project vehicles, use of buses to reduce private vehicle use, public access restrictions to work areas; and use of in-vehicle monitoring systems
- initiate and participate in ongoing community campaigns to reduce the likelihood and consequences of vehicle accidents.

Matters of national environmental significance

To manage potential impacts on matters of national environmental significance from the construction and operation of the gas pipeline, APLNG has committed to a range of strategies, as described for terrestrial, marine and aquatic ecology, coastal environment and water resources above.



Commitments—LNG facility

Stakeholder engagement

APLNG will:

- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the project
- continue to participate with government in local and regional planning processes and provide timely information about the project to inform discussion and decision making.

Climate

In order to manage potential impacts of climate change associated with the LNG facility, APLNG will:

- incorporate adaptive management approach to climate change throughout the life of the project
- incorporate the agreed preferred climate change strategies which resulted from the risk assessment into the design process
- cooperate with government, other industry and other sectors to address adaptation to climate change.

Geology and soils

APLNG commits to the following for the construction, operation, and decommissioning of the LNG facility:

- avoid areas of severe erosion potential where practicable
- minimise erosion risk by refining construction techniques, and erosion and sediment control methods
- complete an acid sulfate soils investigation and develop an acid sulfate soils management plan in accordance with the relevant Queensland guidelines
- develop and implement procedures and monitoring programs to identify, investigate and conduct necessary remediation for potential site contamination.

Land use and planning

APLNG will continue to consult with Gladstone Regional Council, Gladstone Ports Corporation, and State and Australian government departments to develop the project consistent with the planning objectives of the relevant jurisdictions.

Landscape and visual amenity

Whilst the proposed LNG facility will have an impact to the existing landscape, APLNG is committed to implementing mitigation measures during construction and operation to reduce potential impacts on the existing landscape and visual amenity.

APLNG will:

- reduce, as far as practical, vegetation clearing required to support the construction and operation of the LNG facility
- landscape cut and fill batters to reduce colour contrast with adjoining vegetation
- ensure that the adjoining on-site bushland is managed to achieve effective visual integration with surrounding coastal landscape
- use a sensitive lighting approach to reduce light spill
- utilise ground flares to reduce visual impact
- be actively involved in the management of the Curtis Island environmental management precinct.

Terrestrial ecology

APLNG will manage potential impacts to terrestrial ecology of the LNG facility and maintain the ecological processes and integrity of the area by the following:

- develop a biosecurity management plan in consultation with State and local government authorities and implemented prior to the construction



- develop a vegetation offsets program in consultation with the Queensland Department of Environment and Resource Management and the Commonwealth Department of Environment, Water, Heritage and the Arts, and will consider ecological values at a regional scale when identifying locations for compensatory offset
- develop and implement species specific management guidelines for threatened flora species
- undertake pre-clearing surveys, erosion controls measures and fauna management
- use a sensitive lighting approach to minimise the potential impact of artificial night lighting on terrestrial fauna.

Aquatic ecology

APLNG will implement an effective management guidelines to mitigate potential impacts to freshwater aquatic flora and fauna.

Marine ecology

APLNG will:

- establish a process for visual observations and recording of dugongs and cetaceans
- use a sensitive lighting approach to reduce light spill impact on marine fauna
- seek to work collaboratively with other Western Basin projects to offset the loss of sensitive marine habitat
- work with government, the Gladstone Ports Corporation, other port users and stakeholders to address loss of fishing access
- utilise community monitoring of fisheries and fisheries habitat where appropriate pre and post construction
- work with the Gladstone Ports Corporation and other port users to develop an industry wide approach to minimise boat strikes to marine mammals and turtles.

Water resources

APLNG will:

- developing and implementing a drainage strategy for the LNG facility to mitigate site flooding from storm events and storm surge
- designing stormwater controls to divert runoff from external areas around LNG facility
- preparing a stormwater management plan to ensure that the quality of stormwater discharged from the hydro-test pond and sediment basin of the LNG facility is monitored
- continue to work collaboratively with Port Curtis Integrated Monitoring Program for whole of Port Curtis water quality monitoring.

Coastal environment

In relation to the coastal environment, APLNG will:

- continue to address potential impacts from the dredging and reclamation associated with the construction of the materials offloading facility and include mitigation in the design
- develop and implement a dredge management plan for construction and ongoing maintenance of the materials offloading facility to reduce potential impacts
- implement monitoring to identify shoreline and near shore impacts resulting from modified hydrodynamics
- continue dispersion modelling to optimise the design of liquid discharges from the LNG facility to the marine environment.

Air quality

APLNG will:

- ensure emissions of pollutants to the atmosphere are minimised and air quality objectives are met
- develop and implement a stack monitoring program to ensure that the air quality objectives and emission standards are achieved.



Greenhouse gases

APLNG will:

- contribute to reducing global GHG intensity by producing LNG which can substitute for higher GHG intensive fuels
- develop ongoing processes for reducing energy consumption and GHG emissions
- use high efficiency aero-derivative drivers for refrigerant compressors
- install waste heat recovery units to meet the process heat requirements of the LNG facility
- reduce operational flaring and venting by:
 - recovering LNG boil-off gas vapours during ship loading
 - developing a leak detection program
 - developing a strategy to minimise plant shutdowns
- develop a GHG management plan, taking into account biodiversity offsets.

Noise and vibration

In order to manage potential impacts of noise and vibration during construction, APLNG will develop and implement construction noise and vibration management guidelines that address potential impacts including:

- scheduling of high noise activities during normal working hours, where practicable
- implementing construction techniques for noise reduction for high noise activities such as piling.

APLNG will further assess design measures for the LNG facility to reduce noise impacts including measures to address low frequency noise.

Waste

APLNG commits to the following waste management and minimisation actions:

- develop and implement a waste management guidelines consistent with the Environmental Protection (Waste Management) Policy 2000 (including waste management hierarchy) for the LNG facility to reduce the risk of contamination of land or water
- ensure removal, transport and disposal of all general waste and regulated wastes by an appropriately licensed waste management contractor and facilities.

Traffic and transport

To reduce the risk of accidents to employees and other transport network users from project operations, APLNG will develop and implement detailed traffic management plans and transport and logistics management plans for constructing and operating the LNG facility.

A range of operational health and safety measures covering the operation of project vehicles will be in place to reduce the risk of motor vehicle accidents.

APLNG will:

- work with National, State, Local governments and industry in regard to infrastructure alterations which may be required to meet the increased demands on the regional and local transport network
- work with Gladstone Regional council and relevant government agencies and service providers to determine the most appropriate options for the use of Gladstone Regional Airport
- continue to support and consult with Gladstone Ports Corporation and relevant regulatory agencies on construction and operational shipping protocols and traffic management
- continue negotiations with Gladstone Ports Corporation and Gladstone Regional Council to determine the most appropriate methodology for managing construction and operational traffic associated with the LNG facility via Fishermans Landing Northern Expansion
- support additional modelling of ship movements within the Port of Gladstone.



Indigenous cultural heritage

APLNG commits to continued engagement and negotiations with endorsed Aboriginal Parties and developing and implementing an approved cultural heritage management plan for the APLNG facility study area.

APLNG is seeking to develop long-term relationships with Aboriginal parties and broader Indigenous communities through implementing an Indigenous Engagement Strategy.

Non-Indigenous cultural heritage

APLNG commits to the following:

- archival recording of the fence lines on the LNG facility site prior to the commencement of construction
- implementing procedures during site activities that aim to identify, assess and record undetected non-indigenous heritage sites, including appropriate induction of relevant project personnel.

Social assessment

Employment and business

APLNG will:

- continue to use existing methods or develop new methods to attract people to the workforce who are local to the region, as well as those from under-represented groups
- implement a local content strategy, to participate in or establish programs to assist qualified local and regional businesses with tendering opportunities for providing goods and services for the project
- aim to build collaborative partnerships with government and community organisations, to enhance the capacity for employers to provide jobs and for local people to develop skills and obtain employment
- continue to use existing methods or develop new methods to attract under-represented groups to the workforce
- work with government, the community and industry to plan for potential cumulative impacts and to share information about potential impacts and mitigation measures
- ensure contracts with suppliers and contractors are aligned with APLNG's sustainability principles and objectives
- work closely with EnergySkills Queensland's CSG/LNG Skills Taskforce to help meet the growing skills demand by:
 - creating community awareness about the industry and opportunities
 - enhancing vocational training
 - facilitating career advice and work readiness programs for new entrants and mature entrants from related industries.

Stakeholder engagement

Refer to stakeholder engagement commitments detailed above.

Education and training

APLNG will:

- provide specialised LNG operator training programs, including potential opportunities for on site training on an existing LNG facility
- implement CSG/LNG gateway programs with high schools in the region, in partnership with providers, to promote career opportunities and facilitate employment in the CSG/LNG industry
- continue to collaborate on programs with government, training and educational groups that build the local skills base, to meet the specific needs of the industry and other impacted sectors. This includes ongoing development of apprenticeship, traineeship, scholarship and higher education programs.



Community health and safety

APLNG will:

- expand its community safety awareness program in conjunction with industry partners, government and community groups, to develop responses to project-related community safety issues in the region
- communicate and strictly enforce its code of conduct for all staff and contractors, to uphold a high standard of behaviour
- collaborate with government, industry and other providers to mitigate the impact on health services in local communities, including providing the appropriate level of medical facilities for operating plants and accommodation facilities.

Local services and facilities commitments

APLNG will:

- collaborate on research programs with government, industry and community partners to understand social impacts and opportunities the development creates in the communities in which we operate
- implement community investment programs to support sustainable community development.

Housing and accommodation commitments

APLNG will:

- provide temporary accommodation facilities for non-local construction staff and contractors.
- Expect the operations workforce for the LNG facility to live within the local community in the general housing pool
- mitigate potential impacts on housing affordability and availability, through community programs that involve working with government and agencies that provide housing to people in distress.

Economic assessment

To manage potential impacts of the project on the local and regional economic environments, APLNG has committed to a range of strategies. The economic commitments for these strategies are contained within the social commitments above.

Hazard and risk

APLNG commits to the following:

- continuing hazard and risk studies throughout the project life including HAZOPs, HAZIDs, constructability studies and operability studies
- continue consultation with Civil Aviation Safety Authority and Gladstone Regional Council Airport Services to determine an appropriate course of action to manage any potential impact to aviation safety
- communicate project health and safety practices and results of relevant monitoring through a range of channels such as APLNG's community centre, consultation sessions, media and meetings
- developing a safety report to cover major hazard facility requirements during the project design phase and update as required during the operations phase.

Matters of national environmental significance

To manage potential impacts on matters of national environmental significance from the construction and operation of the LNG facility, APLNG has committed to a range of strategies, as described for terrestrial, marine and aquatic ecology, coastal environment and water resources above.



Glossary of terms and acronyms

Term/acronym	Definition
ABARE	Australian Bureau of Agricultural and Resource Economics
ACSG	Arrow CSG Australia Ltd
APLNG	Australia Pacific LNG project (Origin and ConocoPhillips)
ASX	Australian Stock Exchange
BOE	Barrels of oil equivalent
BSC	Banana Shire Council
CASA	Civil Aviation Safety Authority
CEMP	Construction environment management plan
CG	Coordinator-General
CHRC	Central Highlands Regional Council
CIC	Callide Infrastructure Corridor
CICSDA	Callide Infrastructure Corridor State Development Area
CIIP	Curtis Island Industry Precinct
CIS	Community Investment Strategy
CO ₂ -e	Carbon dioxide equivalents
Commencement of construction	Includes site clearing, earthworks and structural activity
CSG	Coal seam gas
Day	Calendar day
dB(A)	A weighted decibels
DCS	Department of Community Services
DEEDI	Department of Employment, Economic Development and Industry
DERM	Department of Environment and Resource Management
DIP	Department of Infrastructure and Planning
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (formerly the Department of Environment, Water, Heritage and the Arts)
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
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
EM Plan	Environmental management plan
EP	Equivalent persons
EPA	Environmental Protection Agency
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
EPC	Engineering, Procurement and Construction
ESA	Environmentally sensitive area
ESQ	Energy Skills Queensland
FEED	Front end engineering design
FIFO/DIDO	Fly-in fly-out/drive-in-drive out
FLPE	Fishermans Landing Port Expansion
FID	Financial investment decision—date of receipt of a letter to the Coordinator-General of a decision of the proponent's board of directors to proceed to invest the funds necessary to enable the commencement of significant construction works.
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
GHG	Greenhouse Gas



GLNG	Gladstone LNG project
GPC	Gladstone Ports Corporation
GPF	Gas Processing Facilities
QCAL	Good quality agricultural land
GRC	Gladstone Regional Council
GSDA	Government state development area
GSDACIIP	Gladstone State Development Area Curtis Island Industry Precinct
HDPE	High density polyethylene
HICB	Hazardous industry and chemicals branch
HDD	Horizontal directional drilling
HSEMS	Health, Safety & Environment Management System
IDAS	Integrated Development Approval System
JAG	Justice and Attorney-General
kPa	kilopascal
LAN,T	statistical descriptor for the variation of noise
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 APLNG 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.
MCU	Material change of use
mg/L	Milligrams per litre of liquid/gaseous liquid
MNES	Matters of national environmental significance
MOF	marine offloading facility
MRC	Maranoa Regional Council
Mtpa	Million tons per annum
NCA	<i>Nature Conservation Act 1992</i>
NGOs	Non Government Organisations
Origin	Origin Energy Limited
PANS-OPS	Procedures for air navigation services—aircraft operations
pH	Potential of Hydrogen
PLF	product loading facility
P&G Act	<i>Petroleum and Gas Act 2004</i>
Petroleum activities	As defined in the P&G Act apart from exploration activities
QCLNG	Queensland Curtis LNG project
QGC	Queensland Gas Company
QGEOP	Queensland Government Environmental Offsets Policy
QH	Queensland Health
QMEA	Queensland Minerals and Energy Academy
QR	Queensland Rail
QWC	Queensland Water Commission
RCCC	Regional Community Consultation Committee
RE	Regional Ecosystem
RIA	Road impact assessment
RMP	Road-use management plan
RO	Reverse osmosis
ROC	Reverse osmosis concentrate
ROW	Right of way
SDPWO Act	<i>State Development and Public Works Organisation Act 1971</i>
SCL	Strategic Cropping Land
SEIS	Supplementary Environmental Impact Statement
SES	State Emergency Service
SIA	Social Impact Assessment
SIAU	Social Impact Assessment Unit



Significant construction works	Works associated with major aboveground construction of industrial plant and equipment such as field compressor stations, central processing plants, associated water treatment plants, LNG plant processing components and the LNG export jetty. It does not include site access works, land clearing and bulk earthworks and any other matters authorised by the Coordinator-General.
SIMP	Social Impact Management Plan
SISP	Social Infrastructure Management Plan
SLA	Statistical local area
SPA	<i>Sustainable Planning Act 2009</i>
The Narrows	A body of water between Curtis Island and the mainland. In particular, this report uses the term to refer to the waters between Friend Point on the mainland to Laird Point on Curtis Island
The Policy	Sustainable resource communities policy
TDS	Total dissolved solids
TJ/d	Terra joules per day
TOR	Terms of Reference
TMP	Traffic Management Plan
TWAF	Temporary workers accommodation facility
ULDA	Urban Land Development Authority
µS/cm	Microsiemens per centimetre
void	means any human-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
WDRC	Western Downs Regional Council
WICT	Wiggins Island Coal Terminal
WTF	Water Treatment Facility
>	greater than
<	less than

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