



Australia Pacific LNG Project

Initial Advice Statement

27 March 2009



Cover picture

Left photo - an operating coal seam methane gas well of Australia Pacific LNG Limited's

Right photo - the ConocoPhillips operated LNG plant at Darwin, Northern Territory



EXECUTIVE SUMMARY

The Project

Australia Pacific LNG Limited (APLNG) proposes a project which enables the creation of a world scale, long-term industry in Queensland, utilising APLNG's substantial coal seam gas (CSG) resources. This will generate jobs and further investment in Queensland at a time when many companies are scaling back investments. The Project will significantly contribute to reducing global greenhouse gas emissions. The Project comprises the further development of CSG fields, the construction of a gas transmission pipeline together with the construction of a liquefied natural gas (LNG) plant and associated facilities to export the gas to international markets. It is the largest CSG to LNG project under consideration in Australia with the LNG plant expected to produce up to 16 million tonnes per annum (Mtpa) when all four trains have been constructed.

Gas will be delivered to a coastally located LNG plant via a gas transmission pipeline where it will be liquefied prior to export in LNG tankers to international markets. APLNG has undertaken a site selection study which has identified a number of options for a suitable location for development of the LNG plant in Queensland. One of these locations is Curtis Island, Gladstone which is within the Curtis Island Industry Precinct of the Gladstone State Development Area. A site in the Curtis Island Industry Precinct represents the base case. Alternative sites are being considered within the Port of Gladstone. Alternatives will be assessed having regard to the outcome of the Queensland Government's *Gladstone Port Western Basin Master Plan*, further siting studies by APLNG and stakeholder consultation. Figure 1 illustrates the Project's development concept (see pages 3 and 4).

Project Benefits

The Project will generate significant benefits at regional, State and national levels, including the following:

- Capital investment of the order of A\$35 billion through to 2020;
- Creation of a new long-term gas processing and export industry in Queensland;
- Creation of 4,000 to 5,000 jobs during the peak construction phase;
- Creation of 1,000 jobs during the operation of the Project;
- The Project will significantly contribute to reducing global greenhouse gas emissions;
- Expenditure in regional economies through the purchase and use of local resources, where practicable, for the construction and operation of the plant;
- The potential commercial and beneficial use of treated CSG water for regional markets;
- Generation of Queensland and Commonwealth Government revenue over the life of the Project; and
- Raising the profile of CSG production in Queensland.



The Proponent

APLNG is a company co-owned by Origin Energy Limited (Origin) and ConocoPhillips. APLNG has interests in major producing CSG fields, including Spring Gully and Fairview in the Bowen Basin and the Undulla Nose in the Surat Basin, and is the largest producer of CSG in Australia. It also holds significant interests in less developed areas across the Walloons Fairway and in the prospective Galilee Basin. Origin will be responsible for the construction and management of the CSG-related activities including pipeline construction on behalf of APLNG, with ConocoPhillips responsible for the construction and management of the LNG plant on behalf of APLNG.

APLNG has the financial and technical support of Origin and ConocoPhillips who bring leading expertise in CSG and, in ConocoPhillips' case, in LNG. The full experience of both companies will underpin the ongoing development of this Project. The Project's schedule has been established and funding has been committed by the proponents to enable the Final Investment Decision (FID) to be made for the first stage of the Project in late 2010, subsequent to the successful completion of an environmental impact assessment process and detailed planning and Front End Engineering and Design (FEED) work.

Stakeholder Engagement

APLNG is committed to sustainably implementing the Project and will work with communities in the areas in which it will operate. Both Origin and ConocoPhillips have extensive community engagement programs and experience in working with communities. APLNG will draw on this experience and looks forward to working closely with all interested and potentially affected stakeholders, including Government agencies, in the planning, development and operation of the Project.

Purpose of the Initial Advice Statement

This initial advice statement for the Project has been prepared in support of an application under the *State Development and Public Works Organisation Act, 1971* for a declaration of 'significant project, for which an EIS is required' by the Coordinator-General. The document is designed to enable stakeholders (including the general community) to determine the nature of, and their level of interest in, the proposed Project.



CONTENTS

1.	Introduction	1
1.1	Project Overview.....	1
1.1.1	The Gas Fields	1
1.1.2	The Gas Transmission Line.....	2
1.1.3	The LNG Plant.....	2
1.1.4	Ancillary Infrastructure.....	5
1.1.5	Project Schedule	5
1.2	Project Proponent.....	5
1.3	Project Financing.....	7
1.4	Need for the Project.....	7
1.5	Project Economic Benefits.....	8
1.6	Regulatory Approvals Process	9
1.6.1	Commonwealth.....	9
1.6.2	State Government	10
1.6.3	Local Government	12
1.7	Document Purpose and Scope.....	12
2.	Project Proposal	13
2.1	Gas Fields.....	13
2.1.1	The Resource	13
2.1.2	Gas Wells and Gathering System	13
2.1.3	Gas Plants and Gas Product.....	14
2.1.4	Associated Water Management Strategies.....	14
2.1.5	Power Supply	16
2.1.6	Water	16
2.1.7	Transportation	16
2.1.8	Workforce and Accommodation	16
2.2	Gas Transmission Pipeline.....	17
2.2.1	Pipeline Corridor.....	17
2.2.2	Pipeline Characteristics	17
2.2.3	Supporting Infrastructure.....	17



2.2.4	Pipeline Construction.....	18
2.2.5	Pipeline Operation.....	18
2.2.6	Workforce and Accommodation	19
2.3	LNG Plant	19
2.3.1	LNG Plant Site Options	19
2.3.2	Plant Components and Operational Processes	19
2.3.3	Ancillary Infrastructure Requirements	23
2.3.4	Workforce	24
3.	Existing Environment and Potential Impacts	25
3.1	Biogeographical Setting.....	25
3.2	Terrain.....	25
3.2.1	Existing Environment.....	25
3.2.2	Potential Impacts	26
3.3	Land Tenure and Use	27
3.3.1	Existing Environment.....	27
3.3.2	Potential Impacts	28
3.4	Air Quality	28
3.4.1	Existing Environment.....	28
3.4.2	Potential Impacts	29
3.5	Noise and Vibration	30
3.5.1	Existing Environment.....	30
3.5.2	Potential Impacts	30
3.6	Water Resources	31
3.6.1	Existing Environment.....	31
3.6.2	Potential Impacts	33
3.7	Terrestrial Ecology.....	34
3.7.1	Existing Environment.....	34
3.7.2	Potential Impacts	35
3.8	Aquatic Ecology	36
3.8.1	Existing Environment.....	36
3.8.2	Potential Impacts	37
3.9	Marine and Coastal Ecology.....	38



3.9.1	Existing Environment.....	38
3.9.2	Potential Impacts	39
3.10	Cultural Heritage.....	40
3.10.1	Existing Environment.....	40
3.10.2	Potential Impacts	40
3.11	Waste.....	40
3.11.1	Existing Environment.....	40
3.11.2	Potential Impacts	41
3.12	Traffic and Transport	42
3.12.1	Existing Environment.....	42
3.12.2	Potential Impacts and Mitigation Measures.....	43
3.13	Socio-economic Aspects	43
3.13.1	Existing Environment.....	43
3.13.2	Potential Impacts	44
3.14	Hazard and Risk Assessment	45
3.14.1	Existing Environment.....	45
3.14.2	Potential Impacts	45
4.	Environmental, Health and Safety Management	47
4.1	Health, Safety and Environmental Management Systems	47
4.2	Climate Change and Greenhouse Policy	47
5.	Stakeholder Engagement.....	49
5.1	Stakeholder Engagement Principles	49
5.1.1	Stakeholder Engagement Objectives	49
5.2	Stakeholder Engagement Process	49
6.	References.....	51
7.	Abbreviations and Glossary of Terms.....	52

APPENDICES

Appendix A Company Policies



1. INTRODUCTION

1.1 Project Overview

Australia Pacific LNG Limited (APLNG) is seeking to accelerate the development and production of its coal seam gas (CSG) reserves in Queensland through the development of a CSG to liquefied natural gas (LNG) project. The proposed CSG to LNG Project, which is the largest under consideration in Australia, will encompass the further development of APLNG's CSG fields, the construction of a gas transmission pipeline(s), together with the construction of a LNG plant and associated port infrastructure to export LNG to international markets. This Project is referred to herein as the Australia Pacific LNG Project (the Project). Figure 1 illustrates the Project's development concept (see pages 3 and 4).

1.1.1 The Gas Fields

APLNG has interests in major producing CSG fields including Spring Gully and Fairview in the Bowen Basin and the Undulla Nose in the Surat Basin. It also holds significant interests in less developed areas across the Walloons Fairway, which constitutes the Walloons Gasfields development area (refer Figure 1).

As the only company with extensive acreage in both of the 'sweet spots' of Queensland CSG, APLNG's aggregate holding in these basins exceeds that of any other CSG producer. These areas represent a world-class CSG accumulation, with comparable characteristics and scale to the San Juan Basin in the USA, which has been producing significant volumes of CSG since the 1980s.

With the largest portfolio of independently certified CSG reserves and resources in Australia, comprising 4,751 PJ of 2P reserves, 10,138 PJ of 3P reserves and 15,869 PJ of Contingent resources (independently certified by NSAI as of 30 June 2008), APLNG expects that its CSG interests will be adequate to deliver the Australia Pacific LNG Project over its development life.

APLNG's interests in the Walloons Gasfields are under development pursuant to existing approvals including petroleum leases and licensed pipelines or are subject to applications for petroleum leases or other petroleum authorities to supply coal seam gas to the domestic market. This includes the Talinga Development Project for production of up to 90TJ/day of coal seam gas on PL226. Development for existing and future domestic gas contracts and for network integration and reliability under APLNGs commercial programs are outside the scope of this Project, as are exploration activities including pilot programs.

CSG production will need to be increased significantly from current levels in the years leading up to the commissioning of the LNG plant, with each nominal 3.5 to 4 Mtpa train requiring around 200 PJ of gas annually. With an ultimate project size of 16 Mtpa, around 800 PJ of gas will be required annually, which is more than the 667 PJ produced across the entire East Coast of Australia in 2007 (EnergyQuest, November 2008). This Project will involve the expansion of production of coal seam gas from the Walloons Gasfields to supply the LNG Plant over and above production for existing and future contracts under APLNGs commercial programs for domestic gas supply.



1.1.2 The Gas Transmission Line

One or more high pressure, gas transmission pipelines will be needed to deliver the processed pipeline quality coal seam gas to the LNG plant. The gas transmission pipeline(s) will be approximately 400 km in length, with the final length depending on the pipeline route selected and the location of the LNG plant. It is expected that this pipeline(s) will run from the northern Walloons area and track north towards the LNG plant to be located on the coast. The pipeline study area also includes the future potential requirement to deliver gas from the existing Spring Gully and Fairview gas fields into the Project. The final corridor will depend on detailed route selection studies, the site selection processes for the LNG plant (refer Section 1.1.3), and will have regard to the outcome of the Queensland Government's *Surat to Gladstone Multi-user Corridor Planning Study*.

1.1.3 The LNG Plant

LNG Plant Location

APLNG has undertaken a site selection study which has identified a number of options for a suitable location for development of the LNG plant in Queensland. One of these locations is Curtis Island, Gladstone which is within the Curtis Island Industry Precinct of the Gladstone State Development Area. Whilst a site in the Curtis Island Industry Precinct represents the base case, alternatives are being considered within the Port of Gladstone. Alternatives will be assessed having regard to the outcome of the Queensland Government's *Gladstone Port Western Basin Master Plan* and further siting studies by APLNG and stakeholder consultation.

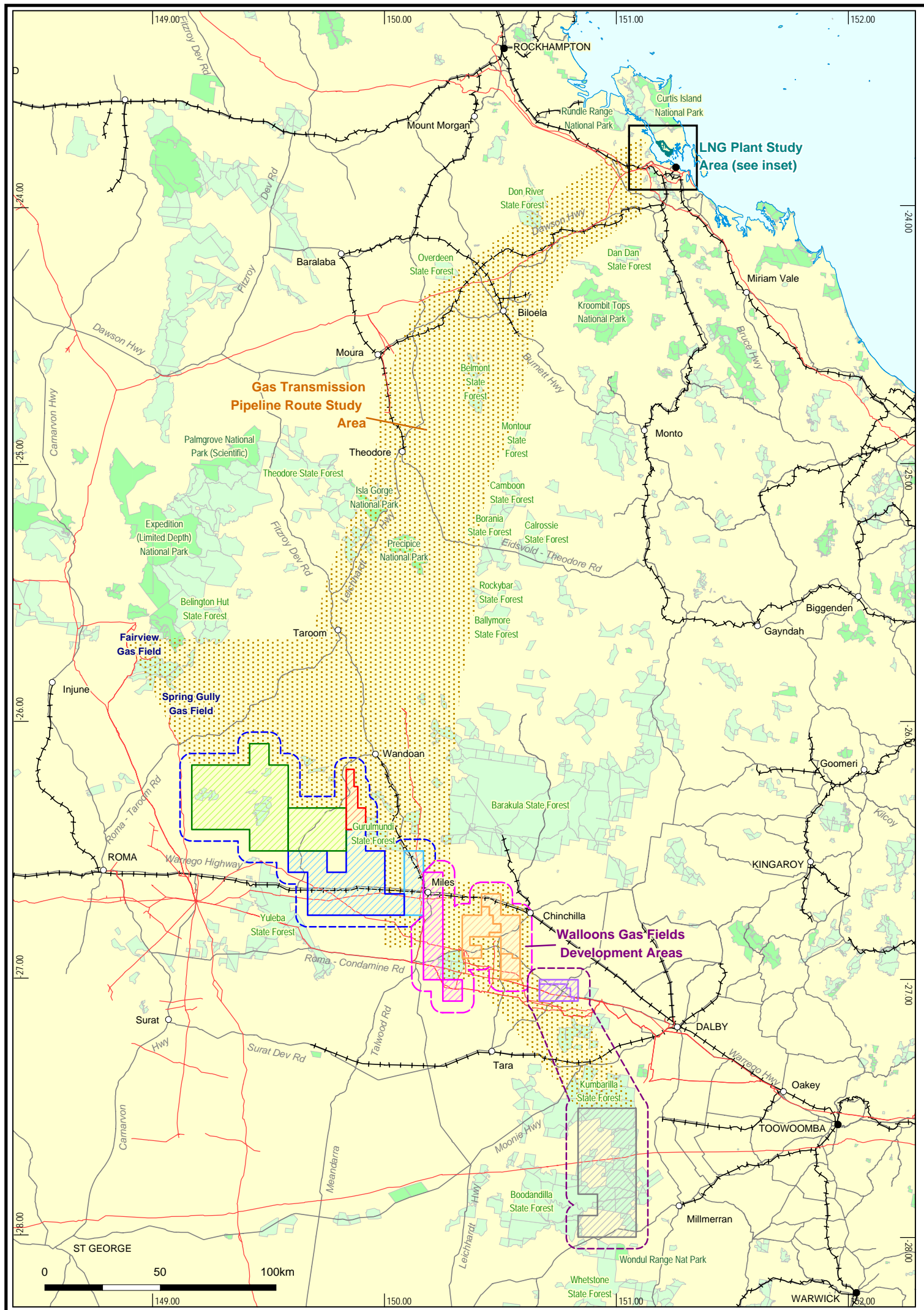
Given the scale of the Project the siting of the LNG plant is not dependent on access to shared infrastructure, enabling it to be developed at an independent location.

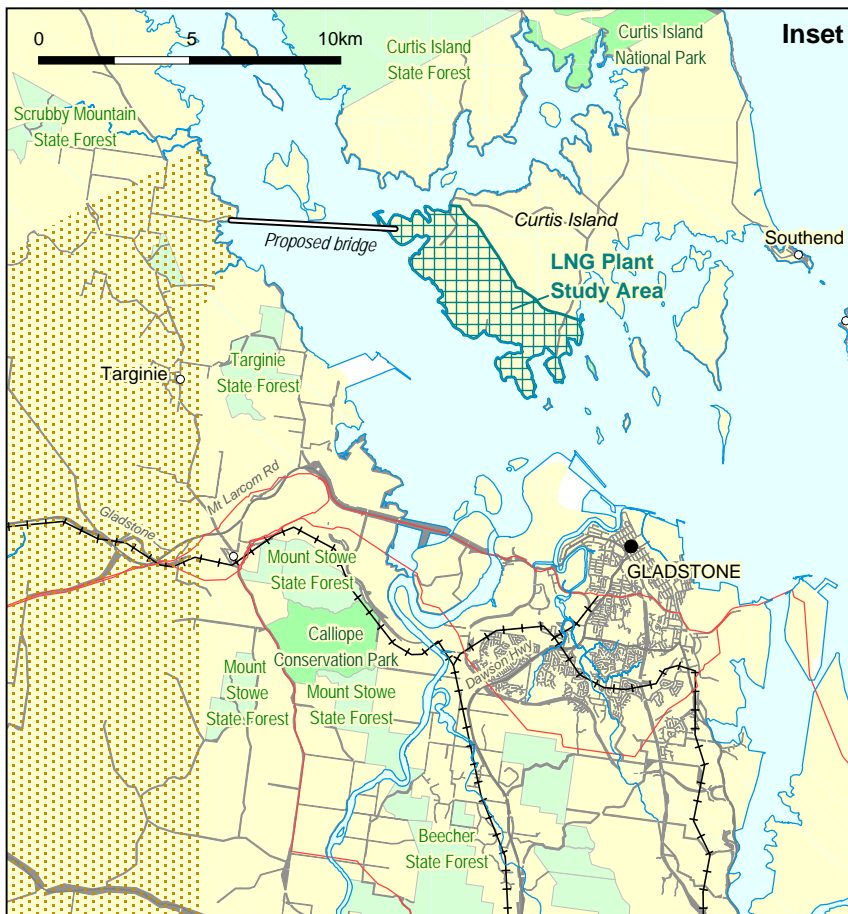
LNG Plant

The LNG plant will be developed in stages, with an ultimate capacity of around 16 Mtpa of LNG. The configuration of the LNG plant is yet to be determined but may comprise four by 3.5 to 4 Mtpa trains, or similar. Per train, this will require approximately 200 PJ of gas per annum to produce 3.5 to 4 Mtpa of LNG, which is roughly equivalent to 8 million m³ of LNG per annum.

The gas is planned to be sourced from the expansion of the Walloons Gasfields as referred to in Section 1.1.1. Gas may also be drawn from APLNG's existing operational sites including Spring Gully, other non-operated equity areas and may eventually be sourced from APLNG's exploration areas in other gas fields. The ultimate gas requirements and train configuration will be determined during the pre-front end engineering design (pre-FEED) stage. Supply of gas from areas other than the Walloons Gasfields is outside the scope of the approvals being sought for the Project.

The LNG plant will utilise ConocoPhillips' proprietary Optimized Cascade[®] technology, which is a proven and reliable technology that is well-suited to a CSG application. The Darwin LNG Plant, which was developed by ConocoPhillips in 2006, utilises this technology and is of similar design to that being planned by APLNG for this development.





Inset

LEGEND

- Existing Pipeline
- Railway
- Road
- Proposed bridge to Industry Precinct (inset)
- National Park
- State Forest

LNG Plant and Gas Transmission Pipeline Study Areas

- Curtis Island Industry Precinct of Gladstone State Development Area - LNG Plant Site Study Area (inset)
- Gas Transmission Pipeline Route Study Area

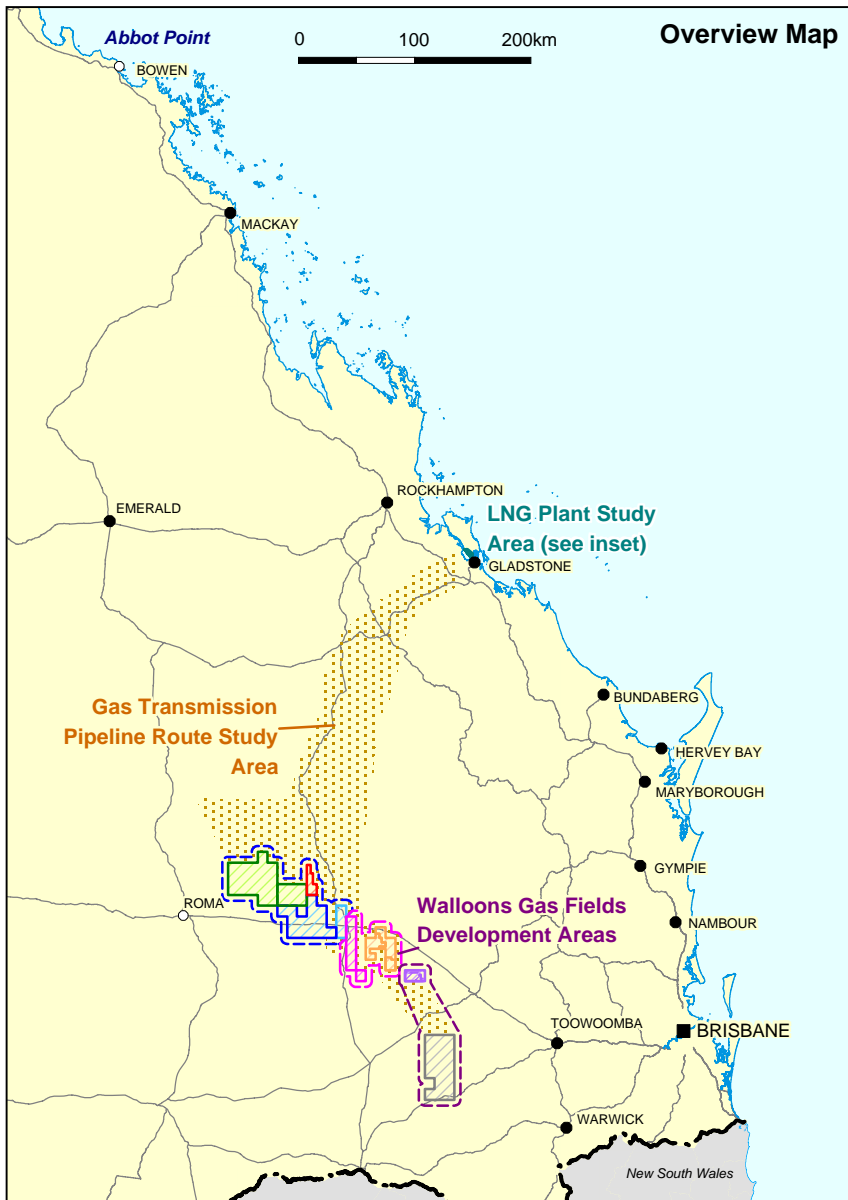
Walloons Gasfields Development Areas

- Combabula / Ramyard
- Woleebee
- Carinya
- Condabri
- Talinga / Orana
- Dalwogan
- Kianama
- Gilbert Gully

Development Sequence

- 1 Undulla Nose (Central) Section
- 2 Northern Section
- 3 Eastern Section

Map Projection:
Latitude / Longitude
Geocentric Datum of Australia 1994



Overview Map

This map incorporates data which is
 © Commonwealth of Australia (Geoscience Australia) 2009
 The Commonwealth gives no warranty regarding the accuracy, completeness, currency or suitability for any particular purpose.
 © The State of Queensland (Environmental Protection Agency) 2009 © The State of Queensland (Department of Natural Resources and Water) 2009 © The State of Queensland (Department of Main Roads) 2009
 Users of the information recorded in this document (the Information) accept all responsibility and risk associated with the use of the Information and should seek independent professional advice in relation to dealings with property.
 Despite The State's best efforts, The State makes no representations or warranties in relation to the Information, and, to the extent permitted by law, exclude or limit all warranties relating to correctness, accuracy, reliability, completeness or currency and all liability for any direct, indirect and consequential costs, losses, damages and expenses incurred in any way (including but not limited to that arising from negligence) in connection with any use of or reliance on the Information.
 © WorleyParsons Services Pty Ltd
 While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.



**AUSTRALIA PACIFIC
LNG LIMITED**

**AUSTRALIA PACIFIC LNG PROJECT
Figure 1: Project Concept**



1.1.4 Ancillary Infrastructure

The establishment of the LNG plant will require the construction of wharf and jetty structures to enable the loading of the LNG vessels. Construction may also involve the establishment of a marine offloading facility (MOF) for the transfer of building materials and heavy equipment to the project site. Standard infrastructure services (power, water, telecommunications, and sewage disposal) will also need to be established.

The construction of the marine infrastructure will involve dredging at the wharf, berth pockets, MOF and the subsequent management of the dredged material.

It is understood that any capital dredging required for shipping access to an LNG plant at the Port of Gladstone, will be provided for by Gladstone Ports Corporation, as part of an intended dredging program to enable access for multiple port uses, including LNG plants and loading facilities.

1.1.5 Project Schedule

The Walloons Gasfields will be expanded in stages to meet the required supply for the LNG plant, with the first LNG export from Train 1 expected in 2014.

The anticipated development sequence of the Walloons Gasfields will initially focus on the Talinga field, and then extend west, with the eastern Walloons section likely to be developed last. The timing and ultimate sequencing will depend on the optimisation of the fields. Table 1 below provides an indicative development sequence for the Project.

Table 1 Project development sequence

Milestone	Timing
Commence Front-end Engineering Design (FEED)	2009
Train 1 Financial Investment Decision (FID)	Late 2010
Train 2 FID	2010/11
Train 1 First LNG	2014
Train 2 First LNG	2015
Trains 3 & 4	Post 2015

1.2 Project Proponent

The Australia Pacific LNG Project is being proposed by Australia Pacific LNG Limited (APLNG) which is owned 50:50 by Origin Energy Limited (Origin) and ConocoPhillips.

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 world class CSG reserves and resources in Queensland and ConocoPhillips' proven LNG technology.



APLNG has interests in the form of authorities to prospect and petroleum leases in major producing CSG fields including Spring Gully and Fairview in the Bowen Basin and the Undulla Nose in the Surat Basin. It also holds significant interests in less developed areas across the Walloons Fairway and in the prospective Galilee Basin.

APLNG is already the largest producer of CSG in Australia, and expects to more than double its current CSG production by 2011 in order to supply Origin's gas fired generation plants and large customers such as Incitec Pivot and Rio Tinto Aluminium.

Origin will be responsible for the construction and management of the CSG-related activities including pipeline construction on behalf of APLNG, with ConocoPhillips responsible for the construction and management of the LNG plant on behalf of APLNG. The full experience of both companies will underpin the ongoing development of this Project.

APLNG contact details are as follows:

Australia Pacific LNG Limited

GPO Box 148

BRISBANE Qld 4001

Toll free No. 1800 526 369

Email: contact@aplng.com.au

Origin (50% owner of APLNG)

Origin is the largest integrated energy company operating across Australia and New Zealand. Listed in the ASX top 20 the company has over 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. Origin services more than three and a half million electricity, natural gas and LPG customers across Australia, New Zealand and the Pacific.

Origin has a strong focus on ensuring the sustainability of its operations, is the largest green energy retailer in Australia with close to 500,000 green energy customers, and has significant investments in renewable energy technologies.

Origin has led the development of coal seam gas in Australia. After acquiring its first CSG interest over 11 years ago Origin has the longest history of CSG production experience in Australia.

Origin has consolidated its position in Queensland having already invested over A\$2.5 billion in power generation, gas exploration and production and energy retailing. Origin currently retails natural gas, electricity and LPG to over 1 million customers in Queensland alone and is the leading producer of CSG, supplying around 25% of Queensland's total gas requirements (EnergyQuest, 2008).

Origin is a founding member of the Australian Business Roundtable on Climate Change.

ConocoPhillips (50% owner of APLNG)

ConocoPhillips is the third-largest integrated energy company in the United States, based on market capitalization and oil and natural gas reserves. The company is the fifth-largest refiner and the sixth-largest reserves holder (excluding non government-controlled entities) in the world.

ConocoPhillips has approximately 33,100 employees and operations in nearly 40 countries. Headquartered in Houston, Texas, the company has assets of US\$190 billion and US\$253 billion of annualized revenues as of June 30, 2008.



ConocoPhillips is a leading developer and operator of LNG projects around the world, using lean (low energy content) gas, similar to CSG, having built the world's first lean gas LNG project at Kenai, Alaska in 1969. The plant has continuously produced LNG for the Japanese market. Additionally, ConocoPhillips has over 25 years of working experience with CSG and is the largest producer of CSG in the United States.

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. Its major producing assets are the Bayu-Undan gas condensate field in the Timor Sea, Darwin LNG Plant in the Northern Territory and the 500 km sub-sea pipeline linking the two facilities. The Darwin LNG Plant is amongst nine LNG plants developed worldwide using ConocoPhillips' Optimised Cascade[®] Process technology, and is the most recent LNG plant developed in Australia, using the same technology as is proposed here. The Darwin LNG Plant was successfully delivered on time and on budget.

Therefore, collectively the APLNG shareholders are well placed to deliver the proposed Australia Pacific LNG Project.

1.3 Project Financing

Origin and ConocoPhillips will provide equal funding for the Project. Both shareholders are publicly listed companies, hold investment grade credit ratings and have access to equity and global debt markets. Both shareholders currently have committed finance to fund the Project through to financial investment decision (FID) stage. Additional funding will be made available from the shareholders via a combination of existing committed debt facilities, additional debt and/or equity finance and business cash flow.

ConocoPhillips has a market capitalisation of around US\$70 billion and annual cash flow from operations of around US\$25 billion. Origin has a market capitalisation of around A\$12 billion and a strong balance sheet with no net interest bearing debt and a significant cash balance.

1.4 Need for the Project

This Project enables the creation of a world scale industry in Queensland, utilising APLNG's substantial CSG resources. This will generate jobs and further investment in Queensland, at a time when many companies are scaling back investments.

The 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*;
- 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, PETRONAS, BG Group and Shell; and
- Rising global energy demand has opened up the potential for development of an LNG export industry from Queensland using CSG as the feedstock.

The Australian Bureau of Agriculture and Resource Economics (ABARE) has estimated the ultimate potential CSG resource in Eastern Australia to be approximately 250,000PJ. Data published by the Department of Infrastructure and Planning (DIP) in *Liquefied Natural Gas and Coal Seam Gas Sector Issues Paper - October 2008*, and company sources suggests that there will be sufficient gas available to meet Queensland's forecast domestic requirements as well as the gas required to support an LNG industry.

LNG has become a major export product for Australia, worth about A\$5.9 billion in export income in 2007 – 2008 (ABARE Australian Commodities, 2008). Australia has become an important world supplier for nations seeking secure energy supplies produced in a stable economic and political environment.

Demand is growing because LNG is safe, flexible, reliable, economic and environmentally acceptable. In 2007 global demand for LNG was 175 million tonnes with the Asia Pacific region accounting for 65 % of this trade (Flower LNG Associates, 2008). Australia's proximity to Asia and its stable political and economic environment mean that Australia's substantial gas resources are very attractive to Asian LNG consumers. The growing demand for LNG in Asia and the expected supply shortfall from current LNG production channels provides an opportunity for the significant expansion of Australia's LNG industry.

The Project supports Queensland Government policies and strategies including *Climate Smart 2050* and *Smart State Strategy 2008-2012*.

1.5 Project Economic Benefits

APLNG seeks to develop a world-class resource into a viable long-term industry for Queensland.

The Project represents a significant level of investment, with capital expenditure of the order of A\$35 billion through to 2020. This capital expenditure estimate is based on a four train project with a nominal capacity of 16 Mpta and economic conditions, industry costs and exchange rates prevailing in 2008, (around 40% of the project costs are denominated in Australian dollars with the remainder denominated in US dollars, Yen and Euro). The capital expenditure associated with this Project relates to all necessary planning and approvals, reserves definition, development of the gas fields, construction of gas transmission infrastructure and the LNG plant. In the current uncertain economic climate there may emerge cost reduction opportunities associated with sourcing of materials and construction costs for large infrastructure projects. More detailed financial analysis, including cost optimisation, and budgeting, will be undertaken during the FEED process. This will occur ahead of FID for the first stage of the Project, which is anticipated in late 2010. This investment will generate considerable long-term economic benefits on a regional, State and national scale.

The key benefits of the Project are:

- Creation of a new long-term gas processing and export industry in Queensland utilising APLNG's substantial CSG resources;



- Immediate and future employment of some:
 - 4,000 to 5,000 people during construction of the CSG field, pipeline and LNG plant, and
 - 1,000 permanent employees during the operation of the Project;
- The Project will significantly contribute to reducing global greenhouse gas emissions;
- Expenditure in the local economy through the purchase and use of local resources, wherever practicable, for the construction and operation of the plant;
- The creation of opportunities to diversify rural and regional economies in a manner that will help sustain their long-term viability;
- Raising the profile of CSG production in Queensland;
- The potential commercial and beneficial use of treated CSG water for regional markets; and
- The generation of Queensland and Commonwealth Government revenue over the life of the Project.

The consequences of not proceeding with the Project would be the non-realisation of the above benefits to the detriment of the local, regional and Australian economies.

1.6 Regulatory Approvals Process

Due consideration of the likely environmental impacts of the proposed development under various Commonwealth, State and Local legislation, guidelines and policies is a project requirement. This section identifies key legislation and other documents and guidelines relevant to the environmental management and compliance of the Project.

1.6.1 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

At the Commonwealth level, the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) applies to those actions that are likely to have a significant impact on matters of National Environmental Significance (NES). Matters of NES include World Heritage properties, National Heritage List places, wetlands listed under the Ramsar Convention as wetlands of international importance, nationally threatened species and ecological communities listed under the EPBC Act, migratory species listed under the EPBC Act, and the Commonwealth marine environment.

The Project will be referred to the Federal Environment Minister to seek a determination on the potential impacts of the Project on matters of NES, and whether the Project, or any of its components, would constitute a 'controlled action', and therefore require formal assessment, 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 *State Development and Public Works Organisation Act, 1971*. This allows a single assessment process to occur, thus avoiding duplication. The assessment and approval process is outlined in Figure 2 in Section 1.6.2 below.



Great Barrier Reef Marine Park Act 1975

If the Project requires works or activities to be done within the Great Barrier Reef Marine Park (GBRMP) that are not authorised under a zoning plan, a permit under the *Great Barrier Reef Marine Park Act, 1975* will be required.

Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act, 1981* prohibits ocean disposal of waste materials considered harmful to the marine environment, and regulates the permitted dumping of wastes at sea to ensure environmental impacts are minimised. A permit may be required under this Act to authorise the placement of any dredged material to an offshore spoil ground within Australian Waters.

Native Title Act 1993

The *Native Title Act, 1993* (NTA) provides for the recognition and protection of Aboriginal and Torres Strait Islanders' rights and interests over their land and waters. It establishes ways in which future dealings affecting Native Title may proceed and provides a mechanism for determining native title claims. Native Title agreements may be required to address native title rights over land subject to Native Title.

Civil Aviation Regulations 1988 and Civil Aviation Safety Regulations 1988

The Commonwealth *Civil Aviation Regulations 1988* and *Civil Aviation Safety Regulations 1988* provide the Civil Aviation Safety Authority (CASA) with the power to control the height of objects, structures, buildings and plumes, which might be a hazard to aircraft. These regulations would therefore typically apply to tall structures (i.e. some of the main equipment in the LNG plant process and gas turbine exhausts) and generated plumes (i.e. exhaust from the LNG plant turbines and flares) in the vicinity of certified or registered aerodromes.

Other Regulations

There are various other Commonwealth requirements such as the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) and Australian standards for storing Dangerous Goods (such as flammables, combustibles, toxics, corrosives, etc) which APLNG will comply with as appropriate.

1.6.2 State Government

State Development and Public Works Organisation Act 1971

The proponent is seeking to have the Project declared a "significant project" under the *State Development and Public Works Organisation Act, 1971* (SDPWO Act) and to follow the environmental impact statement (EIS) process defined by this Act.

An EIS provides the general public and relevant stakeholders with information on the need for the Project and its potential social and environmental effects. An EIS provides a process for demonstrating how a project has been planned and can be managed to protect and enhance environmental and social values. It is only following thorough impact assessment and consultation, required under the EIS process, that APLNG will be able to move forwards with making specific applications for project approvals. This process is shown diagrammatically in Figure 2 below.

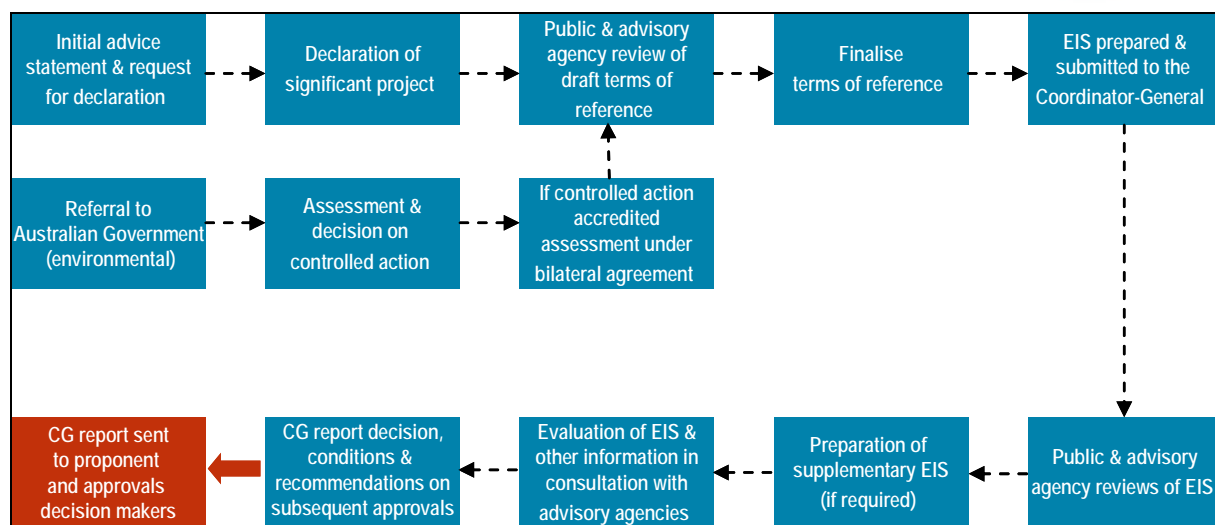


Figure 2 EIS process for a state significant project, for which an EIS is required

Following the completion of the EIS process, APLNG will be required to make a series of component-specific development applications to relevant State Government bodies and to Councils where approvals for material change of use, building or operational works are required under the planning schemes of relevant local governments. The assessment of such applications is informed by the findings of the Coordinator-General’s report.

It is expected that the Project will require the following approvals:

- A petroleum facility licence for the LNG plant, survey licence and pipeline licence for the gas transmission pipeline, and conversion of authorities to prospect to petroleum leases for the gas fields, all under the *Petroleum and Gas (Production and Safety) Act, 2004*;
- An environmental authority (petroleum activity) for the petroleum facility licence, pipeline licence and petroleum leases under the *Environmental Protection Act, 1994* (EP Act) and for a number of environmentally relevant activities (ERAs);
- Whilst activities authorised under the *Petroleum and Gas (Production and Safety) Act, 2004* are exempt from assessment under a Local Planning Scheme, it is anticipated that other approvals will be required under Schedule 8 of the *Integrated Planning Act 1997* including:
 - *Tidal works under the Coastal Protection and Management Act, 1995*, and
 - *A major hazard facility under the Dangerous Goods Safety Management Act, 2001*; and
- A material change of use approval under the SDPWO Act for development within the Gladstone State Development Area.

The Project will also be subject to the requirements of other State acts, policies and regulations including:

- *Aboriginal Cultural Heritage Act, 2003*
- *Fisheries Act, 1994*
- *Vegetation Management Act, 1999*
- *Nature Conservation Act, 1992*



- *Land Act, 1994*
- *Marine Parks Act, 2004*
- *Queensland Heritage Act, 1992*
- *Transport Infrastructure Act, 1994*
- *Transport Operations (Marine Pollution) Act, 1995*
- *Water Act, 2000*
- *Land Protection (Pest and Stock Route Management) Act, 2002*
- *Soil Conservation Act, 1986*
- *Coastal Protection and Management Act, 1995*
- *Dangerous Goods Safety Management Act, 2001*
- *Environmental Protection (Waste Management) Regulations, 2000*
- *State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils.*

1.6.3 Local Government

Project components are located across a number of local government areas. The primary components of the Project will be authorised under the *Petroleum and Gas (Production and Safety) Act, 2004* and thus will be exempt from assessment under Local Government planning schemes. The proposed gas field development area encompasses three Regional Councils, namely Dalby, Toowoomba and Roma, with the pipeline study area traversing north through Dalby Regional Council, Banana Shire and Gladstone Regional Council. The location of the LNG plant is within the Gladstone Regional Council.

Local planning scheme requirements (i.e. land use changes) will be considered in the preparation of the EIS.

1.7 Document Purpose and Scope

The purpose of this Initial Advice Statement (IAS) is to provide information to:

- Assist the Coordinator-General to make a decision on a declaration of the Project as a "significant project" under Section 26 of the Queensland *State Development and Public Works Organisation Act, 1971* (SDPWO Act) which would initiate the statutory impact assessment procedures of Part 4 of the Act;
- Enable stakeholders (including the general community) to determine the nature and level of their interest in the proposal; and
- Assist the DIP on behalf of the Coordinator-General to prepare draft terms of reference (TOR) for an environmental impact statement (EIS) for the proposed Project.

The IAS has been developed to provide a preliminary overview of the nature and extent of the potential social, economic and environmental impacts that may be associated with the construction and operation of the proposed Project as far as they can be foreseen at the concept stage of project planning. The IAS also identifies the key statutory approvals that may be required for the Project to proceed and assessment requirements to be considered in the preparation of an EIS.

2. PROJECT PROPOSAL

2.1 Gas Fields

2.1.1 The Resource

APLNG has the largest portfolio of independently certified CSG reserves and resources in Australia with 4,751 PJ of 2P reserves, 10,138 PJ of 3P reserves and 15,869 PJ of Contingent resources as of 30 June 2008. These include the major producing CSG fields at Spring Gully and Fairview in the Bowen Basin, Undulla Nose in the Surat Basin, and the less developed areas across the Walloons Fairway and in the prospective Galilee Basin.

The gas fields component of the Project, referred to as the Walloons Gasfields (refer Figure 1), cover an area of approximately 370,000 hectares extending from Wallumbilla to Millmerran on the Darling Downs. Staged development of the gas fields is likely to commence with the Undulla Nose area (referred to as the Central Section), progressing west and northward to the Northern Section and then to the Eastern Section (refer Figure 1). Optimisation of the gas fields will be ongoing over the life of the Project.

In situ gas quality will vary slightly between the fields, with the produced gas being predominantly 92 to 99 % methane with very low concentrations of nitrogen, carbon dioxide and ethane.

2.1.2 Gas Wells and Gathering System

Drilling and completion activities will typically target 350 wells per year, but there may be times when the development may need to be accelerated to up to 500 wells per year. It is anticipated that the development of the Walloons Gasfields will occur progressively up to a total of approximately 10,000 wells, over 30 years. Typically, the well spacing will be based on a 750 metres (m) grid. However, there may be areas where the spacing may range between 500 and 2,000 m, subject to the gas production profile and drilling techniques.

In most cases, CSG wells will produce both methane gas and associated water as a two phase mixture that will be separated at the well site via a local separator / metering facility. An underground network of low pressure gathering lines will link individual wells to respective gas and water processing plants. Plate 1 shows typical gas wells.



Plate 1 APLNG operating CSG wells

In addition, the installation of other facilities will be required to support field development; these will include access roads, pipe and equipment stores / stockpile areas, accommodation camps, power and communication systems.

2.1.3 Gas Plants and Gas Product

Gas produced from the field will be transferred via the gathering network to the ‘in field’ gas plants. The gas pressure is increased for transfer into the main transmission pipeline which enables delivery to the LNG plant. A typical gas plant is shown in Plate 2.



Plate 2 APLNG’s operating gas plant at Spring Gully

2.1.4 Associated Water Management Strategies

Associated water from coal seam gas production generally contains salinity levels which preclude general use, except for some applications, such as wash water in coal mining and cooling water in power generation.

In accordance with the Queensland Government's *Coal Seam Gas Water Management Policy (October, 2008)* water not used sustainably in an untreated form will be processed at a central location by APLNG using an integrated membrane system (including reverse osmosis and ion exchangers) for beneficial use in the environment, agriculture, industry or towns. Plate 3 shows APLNG’s reverse osmosis plant at Spring Gully.



Plate 3 APLNG’s operating reverse osmosis plant at Spring Gully

The beneficial use of treated CSG water may include a combination of several options, including:

- Irrigation of agricultural crops, such as provision of water to farmers;
- Agro-forestry and tree cropping including the production of legume trees where the oil rich seed is processed for conversion to biodiesel;
- Urban and industrial uses, which are likely to increase with the development of coal mines and power stations, and an increase in population in regional towns;
- Interim or occasional surpluses of treated water discharged to local river systems (APLNG’s current integrated membrane system will produce permeate with salinity and specific ion concentrations within limits currently found in the river systems); and
- ReInjection into suitable aquifers.

The brine water which is produced during the water treatment process will initially be contained in ponds. These ponds will be fully lined in accordance with Environment Protection Agency (EPA) standards.

A number of options for treatment and recovery of salts from water going to these ponds will be investigated. Options for disposal of salt in brine from water treatment may include:

- Salt recovery - investigations are continuing into the recovery and separation of commercially valuable salts, such as sodium bicarbonate;
- Brine injection – studies are being conducted on the injection of water into salty underground aquifers; and
- ReInjection into depleted gas wells.

The Queensland Government’s *Coal Seam Gas Water Management Policy* provides for CSG water to be injected directly into aquifers of equal or poorer quality water. Further research and consultation will be undertaken to determine if water can be safely reinjected.



Associated water from individual wells will be collected at localised transfer sites. In general, these transfer sites will be located at lower elevations within the field. Each site will require a lined storage pond and pump station to transfer water to the water treatment facility.

Facilities are planned for construction within the northern and central sections of the gas fields to meet the requirements to treat water from gas fields being developed in these areas, prior to management via one or more of the potential strategies outlined above.

2.1.5 Power Supply

The Project is likely to generate its own power using the CSG as fuel for the generation equipment. In circumstances where a local reticulated supply is available, it may be used if such a connection is cost-effective. Diesel generators will also be used for mobile plant and emergency equipment.

2.1.6 Water

Water is required for construction, dust mitigation, irrigation, drinking water and domestic purposes. The selection of water sources will depend on the identification of suitable sources and determined through detailed studies during the EIS.

2.1.7 Transportation

In most cases the access road leading to individual wells will be situated within a cleared right of way (ROW). Roads leading to major infrastructure such as in-field gas plants and water treatment facilities may require all weather access.

The capacity of existing transport infrastructure to support the Project, including roads, rail, airfields, etc. will be assessed during the detailed planning of the Project with details to be provided in the EIS.

2.1.8 Workforce and Accommodation

Construction Workforce

The fields will undergo a staged development over a period of at least 20 years, requiring a workforce of approximately 750 people.

Multiple construction camps will be established in the local region, as required, to service the various well developments and to provide accommodation for the various construction teams, with each temporary camp accommodating approximately 200 personnel.

Operational Workforce

The operation of the gas fields will require an operational workforce to increase to a peak workforce of up to 600 people when all fields are developed.

Permanent camps will be installed in the vicinity of the key infrastructure within the fields. Should such camps be within a reasonable travelling distance of an existing settlement, it may be feasible to base these workers in an existing township.



2.2 Gas Transmission Pipeline

2.2.1 Pipeline Corridor

A study area for the purpose of selecting a pipeline corridor, based on an LNG plant at Curtis Island, Gladstone, is provided in Figure 1. This study area was chosen following a desktop assessment of environmental, social and engineering constraints over a much larger area.

A number of alternative pipeline route options within this study area will be examined, including routes that maximise use of existing and planned common user easements. APLNG intends to use the results of the Queensland Government's current *Surat to Gladstone Multi-user Corridor Planning Study* as a preferred corridor for investigation. The pipeline study area also includes the future potential requirement to deliver gas from the existing Spring Gully and Fairview gas fields into the Project. It is intended that the siting of a preferred pipeline corridor will be progressively refined during future design stages of the Project. The Project's EIS will outline the pipeline route options considered and nominate a preferred pipeline(s) route.

2.2.2 Pipeline Characteristics

The transmission pipeline is required to meet the ultimate capacity of the LNG plant and detailed design will be undertaken for the final configuration, based on the final site location of the LNG plant.

The FEED studies to be undertaken for the pipeline will establish pipeline characteristics in more detail. The pipeline will comply with applicable Australian and industry standards including *AS2885 - Pipelines – Gas and Liquid Petroleum*. If a single pipeline is selected, the diameter may be up to approximately 56 inches.

The pipeline ancillary facilities will also be required and will include mainline valves, scraper stations, compressor stations, cathodic protection systems and telemetry.

2.2.3 Supporting Infrastructure

Water

Water is required for hydro-testing of the pipeline and dust suppression during construction. The selection of water sources and final disposal locations for hydro-test water will depend on the identification of suitable sources, the hydro-test programme and method of disposal for each section of the pipeline network. These will be determined during subsequent detailed studies during the EIS.

Transportation

The transport of the pipe material to the project area is likely to comprise both road and rail. Should pipe need to be sourced overseas, it is anticipated that sea transport and Queensland port facilities will be utilised. Transport and procurement studies will be undertaken to determine the optimum transport solutions.

Electricity

Electricity required for the construction camps will be provided by portable generators. Power will also be needed for mobile and static construction equipment. Permanent grid power will be required for



ancillary systems to support compressor station(s) and telemetry systems. Isolated telemetry systems may use solar power.

2.2.4 Pipeline Construction

The construction of the pipeline(s) is anticipated to take approximately 18 months and will follow the typical construction sequence:

- Construction preparation works;
- ROW establishment;
- Clearing of vegetation along an approved construction corridor;
- The delivery of pipe to laydown areas;
- Pipeline trenching;
- Pipeline assembly, (welding) and lowering into the trench;
- Backfill and pipeline burial;
- Reinstatement of the land; and
- Testing and commissioning of the pipeline.

Prior to commencing construction, existing road and railway infrastructure will be upgraded to facilitate the transport of pipe to stockpile areas near the pipeline route. Temporary construction camps will be established and will be relocated at the completion of each construction cycle. Communication infrastructure will be established to augment existing telecommunication networks.

The pipeline alignment and construction ROW will be surveyed, and arrangements put in place for existing land uses to continue during construction activities.

A pipeline trench will be dug to the minimum depth of cover, as required by *AS2885 Pipelines - Gas and Liquid Petroleum*. In general, long distance pipelines are broken into a number of construction sections or spreads (groups of construction personnel and equipment) in order to accelerate the construction process. Typically, the size of each spread may span between 50 to 100 km. Where the terrain becomes difficult to traverse, such as mountain ranges or rocky outcrops, a dedicated spread may be assigned to allow specialised equipment and crew to focus on these areas. Cathodic protection cable will be installed and connected to the pipe at regular intervals. Surface signs will be provided along the pipeline easements to advise of the presence of a buried gas pipeline in accordance with Australian standards. Figure 3 illustrates a typical pipeline ROW working layout.

2.2.5 Pipeline Operation

During operation, the pipeline is monitored to ensure performance. In addition to electronic surveillance systems, helicopter and ground patrols will periodically check the physical integrity of the pipeline in accordance with the relevant codes and standards.

The operation of the pipeline is non-intrusive and will allow the land affected by the construction of the pipeline to return, after a brief period for rehabilitation, to its normal land use.

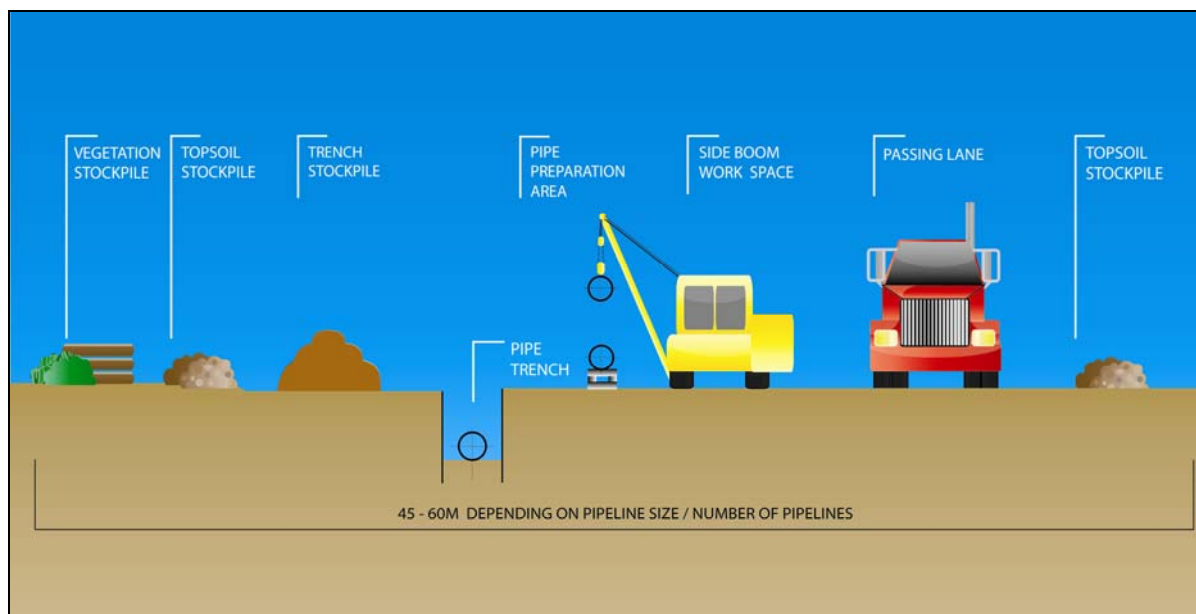


Figure 3 Illustrative cross-section of pipeline ROW

2.2.6 Workforce and Accommodation

Construction Workforce

It is anticipated that a peak construction workforce of approximately 400 people will be required to construct the pipeline(s). This workforce will be accommodated in construction camps established near to the pipeline easement.

Operational Workforce

It is expected that approximately 15 people will be directly employed to manage pipeline operations and to monitor the pipeline.

2.3 LNG Plant

2.3.1 LNG Plant Site Options

As detailed in Section 1.1.3, the process to nominate a preferred location for the LNG plant will have regard to the outcome of the Queensland Government's *Gladstone Port Western Basin Master Plan* and further siting studies by APLNG, and stakeholder consultation. Figure 1 shows the location of the Curtis Island Industry Precinct, and an overview map which shows the broader area of interest for the possible siting of the LNG plant.

2.3.2 Plant Components and Operational Processes

The LNG plant will be developed in stages up to an ultimate capacity of around 16 Mtpa of LNG. The configuration of the LNG plant is yet to be determined but may comprise four by 3.5 to 4 Mtpa trains, or similar.

The proposed Project 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 coal seam gas,
 - Product storage tanks, and
 - Plant infrastructure and utilities;
- A loading jetty(ies) to transfer product to tankers for shipping to market; and
- A construction dock for the transfer of building materials and heavy equipment to the Project site.



Plate 4 ConocoPhillips' Darwin LNG Plant

LNG Plant

The LNG plant will utilise the ConocoPhillips Optimized Cascade[®] LNG Process similar to that currently used at ConocoPhillips' Darwin LNG Plant (refer Plate 4). This process essentially comprises gas pre-treatment and gas production, as outlined below:

- Pre-treatment:
 - Inlet separation,
 - CO₂ removal, and
 - Water removal; and
- Production:
 - Liquefaction,
 - Nitrogen removal, and



- LNG storage and loading.

The simplified process schematic below (Figure 4) outlines the process steps.

Gas Pre-treatment

After the gas is metered it will enter the gas treating section of the LNG plant to remove components within the gas stream that are potentially detrimental to the natural gas liquefaction process. These components are primarily carbon dioxide, water, and any potential hydrogen sulphide. After the gas leaves the treating section it goes through the first stage of chilling that also condenses out some water. The gas then enters a gas dehydration system (typically molecular sieve) to remove the final traces of water. Any water collected is sent to the wastewater treatment system. The final gas treatment step removes any potential trace amounts of mercury to prevent any potential corrosion / damage on downstream heat exchangers.

Gas Production

Following treatment, the gas is fed to the refrigeration system where it is cooled and liquefied. This process also removes nitrogen from the feed gas stream. Three refrigerants (propane, ethylene and methane) will be used in the liquefaction systems to cool the gas to -160 °C. These refrigerants are optimally cascaded to provide maximum cooling by utilising the available power of the gas turbine drivers. This system also serves to maximise energy efficiency. It is anticipated that the plant will use air fin coolers for heat removal in the liquefaction process, and therefore will not require cooling water.

Product Storage

LNG produced from the liquefaction process will be stored on the plant site in specially designed insulated tanks in accordance with *AS-3961 Liquefied Natural Gas – Storage*. Each storage tank is anticipated to store up to approximately 188,000 m³ LNG, which represents approximately 75,000 to 95,000 tonnes of LNG. While it is expected that up to three tanks will be required for four LNG trains, further optimisation will occur as the design progresses and in consultation with the relevant regulatory agencies.

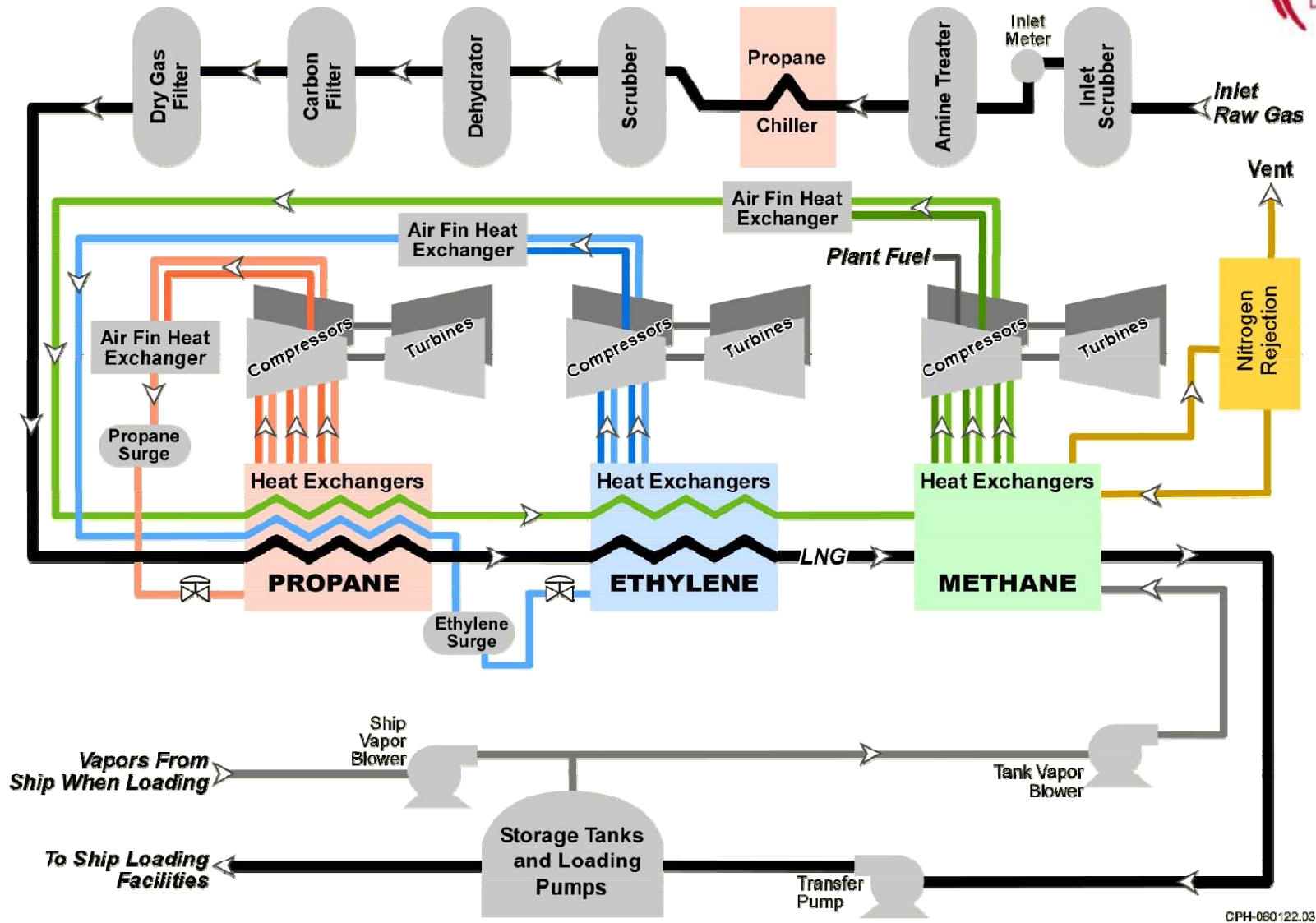
The storage system will include product pumps for ship loading and a boil off compressor to return the vaporised LNG back to the liquefaction section.

LPG Storage

In order to meet the heating value requirements of some LNG customers, it may be necessary to increase the energy content of the LNG by adding LPG. If so, LPG storage may be required. The LPG required for this will most likely be imported using the LNG wharf.

LNG Loading Facilities

A loading facility will be constructed to transfer LNG to vessels for shipment to markets. The same loading facility will most likely be used to import LPG, if necessary.



CPH-060122.03

Figure 4 Simplified Process Schematic of the Optimised Cascade[®] Process



LNG Shipping

LNG will be transported by specially designed ships. At 16 Mtpa nominal average production, LNG vessels will arrive approximately every two to three days for loading and export. Turnaround time for vessels will be approximately 24 hours, with a product loading duration of approximately 14 hours. The LNG tankers will likely have a draught of 11.5 m and be between 260 and 290 m in length with a carrying capacity of 145,000 to 170,000 m³. However, LNG tankers with a capacity of up to 215,000 m³ ("Q-Flex" vessels) will also be considered. These vessels have a draught of 12 m with a length of 315 m, and are the largest LNG tankers currently trading in the Asia Pacific market. Even larger LNG tankers ("Q-Max") are currently being considered by ship owners and so providing facilities suitable for these will also be considered as the design develops.

2.3.3 Ancillary Infrastructure Requirements

Port Infrastructure

In addition to the jetty(ies), berth(s), and loading facilities, the LNG tankers will require a dredged turning basin deep and wide enough to allow safe turning while maintaining a safe underkeel clearance. A dredged approach channel of at least 200 m width and 13 m depth (LAT) may also be required, depending on location. These dimensions may change as the size of the ship is evaluated in more detail.

LNG tankers will also require tugs of sufficient bollard pull to allow safe escort and swing manoeuvres.

Road Access

Details of road access will be defined as the design phase progresses.

Power Supply

It is anticipated that the LNG plant will utilise gas turbine generators to meet its own electrical requirements. However, should there be available power in the local grid, this can be reviewed to determine if it meets the requirements and provides an economic advantage.

Water Supply

The LNG plant's water needs are currently anticipated to be provided by seawater desalination. Further treatment will be required to meet specific needs such as: process water; potable water; and demineralised water. Opportunities for water reuse will be considered as the design progresses.

Telecommunications

Telecommunications needs including phone, computer, and data transmission are anticipated to be provided by satellite based systems. Additional systems will be installed for ship-to-shore radios, field radios, and the like.



2.3.4 Workforce

Construction Workforce

A peak construction workforce of possibly 3,000 – 4,000 people could be required on-site during the concurrent construction of the first two LNG trains, depending on the construction methodology employed. Increased modularisation to manage the anticipated over-demand of available domestic construction labour might result in reduced peak numbers.

The workforce will be accommodated in construction camps and local housing.

Operational Workforce

A workforce of approximately 100 is estimated to be required to operate the first 3.5 to 4 Mtpa train of the LNG plant, with an approximate additional 75 people required for each additional train. Full development to a 16 Mtpa LNG plant will require an approximate operational workforce of 325 people.



3. EXISTING ENVIRONMENT AND POTENTIAL IMPACTS

This Section provides an overview of the nature and extent of the potential environmental and socio-economic impacts that may be associated with the construction and operation of the proposed Project. A detailed assessment will be provided in the EIS.

3.1 Biogeographical Setting

The proposed project area lies within the Brigalow Belt Bioregion. This bioregion is characterised by a mixture of undulating to rugged ranges, coastal areas and alluvial plains. The various components of the Project, gas fields, pipeline(s) and LNG plant, will be likely to extend across six major catchments - the Balonne, Condamine, Dawson, Fitzroy, Calliope and Curtis Island.

The bioregion has a semi-arid to tropical climate with dry winters and wetter summers. Average annual rainfall ranges from 400 mm in the south-west to 1200 mm on the eastern coast and generally decreases from north to south and with distance inland. Temperatures in the bioregion range from 22 – 38 °C in summer to 8 – 22 °C in winter. It contains a mosaic of rangelands, savannas, Brigalow, grasslands and eucalypt woodland interspersed with improved pasture and cropping lands.

3.2 Terrain

3.2.1 Existing Environment

Geology

Gas Fields

Geologically, the tenement area lies across three geologic zones: Surat Basin, Bowen Basin and the Clarence – Moreton Basin. All three basins are intracratonic and filled with predominantly alluvial sediments from the Jurassic, Tertiary, Cretaceous and Quaternary periods. The Bowen Basin covers an area over 60,000 km² in Central Queensland, while the Surat Basin covers an area of 27,000 km² in southern Queensland and New South Wales.

Gas Transmission Pipeline

Geologically, the pipeline study area crosses several geologic zones. These include Surat Basin, Bowen Basin, New England Fold Belt and the Biloela Basin. Geology in this area is comprised of rocks from the Triassic, Cretaceous, Carboniferous, Permian, Devonian – Carboniferous and Quaternary periods.

LNG Plant and Associated Infrastructure

The geology of Curtis Island has been mapped by Queensland Department of Natural Resources, Mines and Water (2006). The mapping shows the Curtis Island area to be underlain by rocks from the Wandilla Formation, which is of Late Devonian to Early Carboniferous age.

The Wandilla Formation is recorded to consist of sequences of mudstone, lithic sandstone, siltstone, jasper, chert, slate and schist units. The solid geology is recorded to be overlain by Quaternary alluvial, colluvial and marine sediments.



Topography and Soils

Gas Fields

Preliminary soils mapping indicates that the gas field development area comprises gentle to moderate undulating and rolling lands with level flood plains, associated with small streams and drainage lines. Soils are generally loamy duplex, deep sandy soils overlying sandy clay and areas of shallow to deep dark grey clays.

Gas Transmission Pipeline

The proposed pipeline study area crosses a variety of soils associated with various terrains. Several generalised regions have been identified.

The pipeline study area traverses the Gilbert, Lynd and Murphy Ranges located north of Taroom, comprising strongly undulating lands increasing to mountainous regions with sandstone ridges. The dominant soils are shallow stony sands and loams.

Continuing north along the study area towards Gladstone, gentle rolling granitic terrain is encountered with isolated areas of steep hilly to mountainous country on meta-sedimentary rocks. The dominant soils are hard acidic yellow and red soils on metasediments and are often stony in areas.

LNG Plant and Associated Infrastructure

The topography of the LNG plant study area within the Curtis Island Precinct is characterised by a mixture of mud flats and gently to moderately sloping hilly areas. Several small drainage lines traverse this area. The Queensland Government's proposed bridge site at "The Narrows" is located on inter-tidal land systems such as mangrove mudflats and salt pans.

The soil cover over Curtis Island is relatively thin (0.5 m to approximately 1.5 m) on hill tops and ridgelines, but thicker (3 m to 5+ m) in the flatter regions. Mudstone outcrops are recorded to exist along the fringes of the mudflat and within the interior portion of the study area.

The western foreshore flats adjacent to the LNG plant study area extend approximately 200 to 400 m from the shore. It is anticipated that these foreshore flats would comprise marine/estuarine muds and sands. The thickness of these deposits is not known.

Acid Sulphate Soils

Previous investigations in the Gladstone area have indicated that acid sulphate soils could be expected to occur in low lying areas containing Quaternary Holocene marine/estuarine muds. The depth of these muds may vary and would be dependent on their proximity to remnant older alluvial material (e.g. underlying Pleistocene clays), residual soils on higher ground and the coastline. It is also noted that the gleyed soils are commonly associated with acid sulphate production.

3.2.2 Potential Impacts

Topography, Geology and Soils

The disturbance associated with the construction of the infrastructure associated with the Project such as the LNG plant, transmission pipeline, gas plants, water facilities and the gathering system will be required to provide a suitable foundation and profile. A terrain analysis will be undertaken during the



detailed route planning phase to assess suitable locations for key infrastructure through identification of constraints and risks.

Soil studies will be undertaken to determine existing soil characteristics (e.g. erodability, presence of acid sulphate soils) and the potential impact the Project may have on soil resources. These studies will also consider potential construction constraints.

Environmental management measures during construction and operation will aim to minimise soil disturbance and erosion. These may include root stock retention, and vehicle movement restriction to existing disturbed areas. Sediment control devices (e.g. contour banks) may be installed to minimise erosion and sediment loading to local waterways.

Issues relating to land management of farming properties covered by the Project will also be addressed and strategies developed prior to construction to ensure the ongoing productivity of this land and reduce erosion and weed dispersal. Management of these properties will be incorporated into the rehabilitation programs.

Land contamination assessment will also be undertaken to specifically identify key areas of potential contamination that may pose a risk to the environment and / or to the Project.

3.3 Land Tenure and Use

3.3.1 Existing Environment

Gas Fields

The tenure of the land within the gas field development area is a mix of freehold, leasehold, small conservation reserves and several State Forests. Notable features of land tenure in the development area are the Western Creek and Kumbarilla State Forests, which are located within the southern area of the gas field. The Barakula State Forest is located in the northern section of the gas fields but does not directly affect a tenement.

Land use in the area is characterised mainly by cattle grazing on native pasture. Many of the areas which have been identified as State Forest are used for production forestry. There is also a mix of cropping, irrigated cropping and intensive animal production in the gas field area. There are pockets of residential land use throughout the gas field area, and associated land uses such as channels, aqueducts, services and horticulture can be found in close proximity to these areas.

Gas Transmission Pipeline

The transmission pipeline study area covers approximately 16,000 square kilometres. The land tenure within this area is varied with the majority of the land in freehold tenure. There is also some leasehold land and areas of State land. There are three timber reserves, several small reserve areas, and a number of State Forests and National Parks. These include Barakula and Coomingleh State Forests, and Kroombit Tops, Bania and Buburin National Parks. Eurimbula Conservation Area is also located within the study area.

Similar to the gas field area, the most prominent land use is grazing on native pasture. The second most prevalent use is production forestry. Other rural uses include nature conservation and cropping. Other land uses include a small area of mining, irrigated cropping and residential uses. Closer to Gladstone there is an increase in residential, irrigated perennial horticulture and marsh – wetland areas.



LNG Plant and Associated Infrastructure

The Curtis Island Industry Precinct of the Gladstone State Development Area is freehold land held by the State of Queensland (represented by the DIP). This area is comprises coastal wetlands and elevated land which is used for cattle grazing on native pasture. Outside of this Precinct there are pockets of residential land use and nature conservation areas.

3.3.2 Potential Impacts

Gas Fields and Gas Transmission Pipeline

The development of the well heads will result in a small area of land being unavailable for other land use activities such as cropping or grazing. The construction of the gas wells, gathering systems and the construction of the gas transmission pipeline will result in temporary and localised disruption of up to 24 months to land use activities. Following construction, the land will be rehabilitated and available for its existing use, with the exception of the footprint of the gas wells. APLNG will implement thorough landowner engagement processes to address specific landowner requirements.

Visual impacts are generally considered to be low given experience to date and established methods for design and rehabilitation, The EIS will discuss the visual impact of the construction and operation of the Walloons Gasfields and gas transmission pipeline, as it relates to the surrounding landscape, on particular panoramas and outlooks.

LNG Plant and Associated Infrastructure

The construction and operation of the LNG plant will result in a change in land use from rural pursuits to major industry, which is consistent with the planning for this area as an industrial precinct. The EIS will discuss the visual impact of the construction and operation of the LNG plant, as it relates to the surrounding landscape, on particular panoramas and outlooks.

3.4 Air Quality

3.4.1 Existing Environment

Gas Fields and Gas Transmission Pipeline

Air emissions from existing agricultural activities will generally consist of dust from cultivation and harvesting activities, exhaust emissions from farm machinery, and greenhouse gases from cattle grazing.

Several townships are located in the surrounding areas. These townships are expected to generate air emissions from motor vehicles as well as domestic industry and business activities.

There is no existing air-shed or air quality model available for the gas fields and transmission pipeline study areas. The nearest of the EPA's air quality monitoring stations is located at Toowoomba, approximately 100 km east of the proposed gas fields and transmission pipeline project areas. Data collected at this station is not considered indicative of the project area.

LNG Plant and Associated Infrastructure

The LNG plant site may be located within the Gladstone airshed, which is affected by emissions from several major industries including the Gladstone power station, Rio Tinto Australia Yarwun refinery,



Orica chemical plant, Cement Australia manufacturing plant, and coal dust from coal ship loading operations.

Air quality monitoring is currently undertaken by the EPA in Gladstone to assemble a detailed emissions inventory for the region and to provide a database for the Gladstone airshed model. The EPA monitoring collects data on ozone, NO₂, SO₂, PM₁₀, benzene, and toluene and visibility reducing particles.

3.4.2 Potential Impacts

Gas Fields and Gas Transmission Pipeline

Atmospheric dust (mainly from clearing, grading, trenching and backfill) as well as exhaust fumes from vehicles and machinery will be the main impacts to air quality during the construction phase of the gas fields and pipeline. These impacts will be localised and short term with dust generation managed through the application of water in dry and windy periods, or when working in proximity to residents. Given the size of the project area and isolated nature of potential emission generation, the impacts on air quality associated with construction activities are expected to be low.

Potential operational impacts from the gas fields and pipeline are primarily associated with emissions from plant and equipment (including gas plants, water plants, compressor stations, and gas flaring). Compressor Stations, in particular, can be associated with emissions of nitrogen oxides and carbon monoxide, which can have negative impacts on nearby sensitive receptors.

Wherever possible, gas field and pipeline infrastructure will be sighted and/or engineered to minimise emissions and their impacts. Detailed air quality assessments and modelling will be undertaken, as part of the EIS process, to achieve compliance with relevant regulatory limits in relation to emissions.

Measures to reduce emissions will be also be identified through the EIS process and integrated into operational procedures as part of the EMP process.

LNG Plant and Associated Infrastructure

The air emissions expected to be generated by the operation of the LNG plant include:

- Direct emissions to the atmosphere from the process and equipment (e.g. carbon dioxide, carbon monoxide, nitrogen oxides, sulphur dioxide, total organic carbon and methane) as described in Section 2.3.2;
- Fugitive emissions generated during emergency and maintenance shutdowns, involving small quantities of coal seam gas; and
- Emissions resulting from flaring.

An assessment of potential air pollutants and air quality impacts based on the design of the LNG plant is proposed to be undertaken to inform the EIS process. This study will utilise the Gladstone airshed model (and other relevant information) to examine the potential effects of emissions on the airshed, and will guide the detailed design of the LNG plant.

Greenhouse gas management for the Project will be based upon ConocoPhillips' and Origin's existing management systems and will be the subject of energy efficiency and greenhouse gas management plans which will identify site-specific goals. Reference to greenhouse policy statements of both Origin and ConocoPhillips are given in Section 4.2.



3.5 Noise and Vibration

3.5.1 Existing Environment

Gas Fields

The existing noise environment throughout the Walloons Gasfields is typical of sparsely populated, fairly rural settings with low level ambient noise dominated by natural sources (e.g. wind, animals and insects).

The noise environment is typically characterised by human activities such as rural and residential occupation and aircraft or road traffic noise.

Existing ground vibration levels are negligible.

Gas Transmission Pipeline

The noise environment in the vicinity of remote sections of the gas transmission pipeline is essentially the same as for the gas fields. Where the pipeline runs near to or within a transportation corridor there will be existing intermittent transportation noise.

As the pipeline corridor approaches Gladstone and Curtis Island, existing ambient noise levels increase due to the influence of industrial process plants in the vicinity of Yarwun, Fishermans Landing and the Port of Gladstone. Approaching the shoreline ambient noise is also significantly influenced by wind.

Existing ground vibration levels are negligible with the exception of certain areas in proximity to industrial infrastructure.

LNG Plant and Associated Infrastructure

Ambient noise in the eastern parts of Curtis Island is dominated by natural sources including wind, waves, insects and birds with the exception of and shipping influences.

In the southern and western parts of the island there is additional noise associated with industrial processes on the mainland and transient shipping.

Existing ground vibration levels are negligible.

3.5.2 Potential Impacts

Gas Fields

Construction activities will temporarily increase noise levels in proximity to the gas field through the operation of vehicles and construction equipment. Given the relative remoteness of much of the gas field area, and short duration of construction, construction noise impacts are considered to be low.

Gas well drilling operations, associated mobilisation of drill rigs and supporting plant are the primary potential sources of noise disturbance to residential locations. As gas drilling rigs normally operate with shift crews on a 24 hour basis the critical potential noise impacts typically relate to the night-period.

Residential locations which may be affected by drilling noise are often located on the same property as the drilling operations. In these situations engagement will occur with the land owner to manage potential short-term noise impacts associated with drilling operations.



Operation of a compressor station, however, is associated with continued noise generation arising from the large gas powered reciprocating engines and compressors. Noise emissions, particularly in the low frequency, can cause annoyance to nearby sensitive receptors if not effectively attenuated.

As part of the EIS process, a detailed acoustic impact assessment will be undertaken for any proposed compressor stations to determine a location and design that minimises impacts to nearby residents and achieves compliance with relevant regulatory criteria

Gas Transmission Pipeline

With the exception of a compressor station(s), there are no intrinsic potential noise impacts associated with the proposed gas pipeline. Temporary noise impacts may occur near residential areas associated with construction activities if such activities are intended during night periods. The principal form of mitigation of construction noise impacts will be community notification of construction works.

LNG Plant and Associated Infrastructure

The principal noise sources associated with LNG plants are the exhausts of gas turbine engines that are utilised to drive compressors, high capacity LNG compressors/piping, and large banks of axial cooling fans. Sensitive receptors in the area would include the South End community on Curtis Island, and a number of isolated residences on nearby smaller islands.

The primary construction noise sources will include heavy earthmoving machinery, power generation equipment, rock-crushing facilities, cranes, and an on-site concrete batching plant.

Potential construction noise impacts may also include temporary displacement of marine fauna during piling works for the wharf structure.

Noise mitigation for the LNG plant will be the subject of detailed acoustical design based on environmental constraints determined from baseline noise monitoring conducted for the EIS.

3.6 Water Resources

3.6.1 Existing Environment

Surface Water

Gas Fields

The gas fields are located within three major catchments. Three gas field tenements are located in the south of the Dawson River catchment; the other proposed gas field tenements are located in the north and northeast of the Balonne River catchment and the east of the Condamine River catchment. A number of major creeks are located within the gas field tenements and may be affected by the construction and operation of the gas field plants.

Gas Transmission Pipeline

The gas transmission pipeline route study area extends across the following five major catchments:

- Balonne River catchment;
- Condamine River catchment;
- Dawson River catchment;



- Fitzroy River catchment; and
- Calliope River catchment.

LNG Plant and Associated Infrastructure

Only minor waterways exist within the Curtis Island Industry Precinct, but the site is immediately adjacent to Port Curtis.

Hydrogeology

Gas Fields

The Walloons Gasfields are principally situated in the Surat Basin; a major sedimentary basin that forms an eastern limb of the Great Artesian Basin in Eastern Queensland.

The major aquifer units through the Surat Basin consist of sandstone, being the: Nullumwurt (Bungil Formation), Mooga, Gubberamunda, Springbok, Hutton and Precipice aquifers.

The Walloon coal measures comprise the CSG target units within the Surat Basin. These units are not considered to represent a significant regional aquifer, nor are the units considered to be hydraulically connected to the Great Artesian Basin aquifers. The Walloon coal measures comprise carbonaceous mudstone, siltstone, minor sandstone and coal. Limited groundwater resources in the Walloon coal measures are restricted to the coal seams where the water is contained and transported in the cleats. The coal seams may vary in thickness from 2 to 10 m and be separated by up to 30 to 80 m of predominantly silts and tight sands that restrict any vertical leakage between seams and overlying and underlying units.

Broadly, groundwater in the Great Artesian Basin flows westward to the south-west over most of the Basin and to the north-west and north in the northern section. The groundwater flow rate in the sandstone aquifers is in the order of 1 – 5 m per year. Recharge to the aquifers occurs by way of rainfall infiltration into the outcropping sandstone aquifers situated along the eastern margins of the Basin on the western slopes of the Great Dividing Range. Natural discharge, as mound springs, occurs in the south-western area of the Basin. In general, the groundwater quality of the Great Artesian Basin aquifers is generally of the sodium-bicarbonate type (Na-HCO₃), with some chloride and sulphate in certain areas.

Gas Transmission Pipeline

The proposed gas transmission pipeline route traverses a wide range of hydrogeological environments beginning in the Surat Basin at the gas fields. Further northeast (in proximity to Theodore) the proposed route intersects the exposed southern end of the Permian to Triassic age Bowen Basin. This basin system is a north-south elongate system with an asymmetric, synclinal geometry. Towards Gladstone, the proposed route traverses the New England Fold Belt comprising a number of variably deformed terranes, ranging in age from Early Palaeozoic to Late Triassic. The sedimentary and volcanic rocks of the New England Fold Belt have been extensively intruded by Carboniferous to Triassic granite.

LNG Plant

Sub-artesian water supply bores are known to exist in the Curtis Island area. The groundwater is likely to be of poor (brackish) quality, but will be investigated as part of the EIS process.



3.6.2 Potential Impacts

Surface Water

Flooding is a seasonal event within the Project's study area. Studies on surface water hydrology, hydraulic and water quality of major waterways within the project area will be undertaken as part of the EIS. These studies will consider the impact of flooding on the Project's infrastructure and will assess possible flood mitigation measures where necessary. For the day to day operation of the gas fields and the LNG plant, it is important to gain an extensive understanding and knowledge of existing flood behaviour of major waterways.

Operations will be designed to ensure downstream impacts are limited and downstream requirements are met regarding the environment and the community. Water quality and flow regimes of waterways will be monitored to assess the impact of operations. Mitigation measures to maintain acceptable water quality especially during the construction phase but also during operation will be identified during the EIS process.

Overall the construction of the Project's components will have regard to the following:

- Reduction of erosion and sediment loading to waterways;
- Minimisation of impacts arising from the establishment of Project's facilities on existing flood behaviour;
- Prevention of water contamination; and
- Minimisation of disturbance to channels and waterways.

Particular activities, such as construction of the LNG plant and the disposal of hydrostatic test water used in the LNG plant commissioning, will require careful management to ensure adjacent coastal waters are not adversely impacted.

Wastewater, hazardous substances and other waste materials used and generated by the Project will be handled, stored and disposed in accordance with legislative requirements and EPA guidelines. Principles for the management of these materials will be outlined as part of the EIS.

Hydrogeology

Gas Fields

The production of associated water has the potential to impact on the hydrogeological environment of the development area.

Activities associated with the gas field that have the potential to impact groundwater quality include:

- Unplanned contaminant releases (predominantly associated with water spills); and
- Water seepage from evaporation ponds to underlying aquifers.

A detailed assessment of the potential impacts on groundwater will be undertaken as part of the EIS process. This will include risks to neighbouring users and ecosystems that may ensue from the development of the proposed gas fields.

Gas Transmission Pipeline

The proposed route of the gas transmission pipeline will traverse a number of major creeks.



The design, route alignment and construction of the transmission pipeline will include controls to minimise the potential environmental impact on surface water bodies and prevent any long-term modifications to watercourses (although short term impacts can be expected during construction). Minimising the disturbances of channels and waterways will assist in preventing significant impacts to underlying aquifers.

LNG Plant and Associated Infrastructure

The construction of the proposed LNG plant and associated operational activities are unlikely to have a significant impact on the hydrogeological environment (i.e. groundwater quantity, quality). Particular activities, such as the disposal of hydrostatic test water used in the LNG plant commissioning, will require careful management to ensure underlying aquifers are not adversely impacted.

3.7 Terrestrial Ecology

3.7.1 Existing Environment

Ecological Communities and Regional Ecosystems

The EPBC Act provides for the protection of Threatened Ecological Communities (TECs), and a Regional Ecosystem (RE) is a term used by the Queensland Department of Natural Resources and Water to describe relationships between major floral species and the environment at a bioregional scale. Endangered Regional Ecosystems are protected by provisions of the *Vegetation Management Act, 1999* (VMA).

The study area contains a number of valuable REs and TECs as follows:

- Gas field development study area contains 35 REs, of which eight are listed as endangered, ten have endangered biodiversity status under the *Environmental Protection Act, 1994* (EP Act), and five form part of a TEC.
- Pipeline study area contains in the order of 132 REs, of which 20 are listed as endangered, twenty-four have endangered biodiversity status under the EP Act, and ten form part of a TEC; and
- Curtis Island Industrial Precinct (assumed LNG plant site study area) contains nine REs of which one is listed as endangered, and two have an endangered biodiversity status under the EP Act.

Threatened and Conservation Significant Flora and Fauna Species

Threatened flora and fauna species are those species listed under the EPBC Act and / or Queensland *Nature Conservation Act, 1992* (NCA) as endangered, vulnerable or rare (EVR). Threatened and conservation significant flora and fauna (EVR) species known or likely to occur within the wider study area have been identified from database searches and are summarised in Table 2.

Flora and fauna species of other conservation significance include all species listed as migratory or marine under the EPBC Act and marine plants protected under the Queensland *Fisheries Act, 1994*.



Table 2 Threatened and conservation significant flora and fauna species likely to occur within the project area

Flora and fauna species	Project study area		
	Gas fields	Pipeline route study area	LNG plant study area
Threatened species	85	160*	60
Conservation significant species	72	130*	151

* Approximate number

Other Protected Areas

Gas Fields

The gas field development area is not included in any World Heritage Area, nor does it involve lands listed on the Register of the National Estate or Commonwealth Heritage List. No National or Conservation Parks, Nature Refuges, Wetlands of International Significance (Ramsar), or significant wetlands listed on the *Directory of Important Wetlands* (DOI Wetlands) are included in this project area.

Several State Forests (SF) are transected by the proposed tenement area including the Dinoun SF, Woodduck SF, Emu SF and Combabula SF (Combabula); Kubarilla SF, Dunmore SF and Western Creek SF (Gilbert Gully); Gurulmundi SF (Woleebee and Corinya); and Condamine SF (Condamine and Talinga). The Woleebee tenement also transects the Stones Country Resources Reserve.

Gas Transmission Pipeline

Several protected areas are mapped within the proposed pipeline study area including natural places listed on the Register of the National Estate (including Boggomoss Areas and the Brigalow Invertebrate Site), national, conservation and environmental parks, scientific areas and the SEQ Regional Forest Agreement areas. A number of DOI wetlands, State Forests and a timber reserve are also located within the study area.

LNG Plant and Associated Infrastructure

The Curtis Island Industrial Precinct, is included in a State Marine Park, and adjoins the Dugong Protection Area in Port Curtis. Part of the Great Barrier Reef World Heritage Area is located within Port Curtis and also adjoins the LNG site study area.

The Port Curtis wetland system also adjoins the LNG site study area and is listed as a nationally important wetland. It covers an area of approximately 30,000 ha and includes the marine, tidal and coastal areas surrounding Gladstone, the southern section of the Narrows and southern Curtis Island. This wetland provides important habitat for birds and other marine animals of national significance.

3.7.2 Potential Impacts

Project activities, notably vegetation removal, have the potential to impact upon flora and fauna species through direct loss or injury to species during construction activities and indirectly through the loss or degradation of habitat areas, habitat fragmentation and / or loss of connectivity. Construction



activities may also impact upon fauna species through increased disturbance from construction noise, vehicle movements and dust production.

Areas of conservation significance will be avoided where practicable through the realignment of proposed pipeline and well locations. In view of this ability to relocate most pipeline and gas field infrastructure, potential impacts on protected areas are expected to be minimal.

Vegetation clearing will be undertaken in accordance with best practice to minimise the potential impact. Rehabilitation programs will be developed and implemented to revegetate and regenerate native vegetation as necessary. Potential impacts will be further addressed through the EIS assessment process and management measures will be incorporated into the Project's EMP(s).

3.8 Aquatic Ecology

3.8.1 Existing Environment

Gas Fields

The gas fields are located within three sub-basin catchments of the Dawson, Balonne and Condamine rivers. Within these catchments are a number of major creeks and rivers. Most creeks and rivers are ephemeral with fish passage and movement of other aquatic organisms only occurring in high rainfall events.

These catchments are highly disturbed from grazing and cropping which is a major contributing factor to the removal of vegetation along the banks of the watercourses. Nitrogen and phosphorous have been elevated in these areas. Erosion is prevalent in most areas.

Gas Transmission Pipeline

The proposed pipeline study area traverses five sub-basin catchments of the Condamine, Balonne, Dawson, Fitzroy and Calliope rivers.

The predominant land use within both of these catchments is grazing. Riparian vegetation within the catchment has been highly modified and available habitat for aquatic organisms within the catchment is generally poor. Erosion is also prevalent in these catchments and as such, there is an increased likelihood of sediment laden discharges.

Palm Tree and Robinson Wetland system is listed on the Commonwealth Directory of Important Wetlands and is located to the west of the proposed pipeline corridor. This wetland is made up of semi-permanent pools and creeks. Groves of *Livistona sp* are located within the wetland and it is a known breeding area for water birds.

Many of the creeks and rivers within these catchments are ephemeral so movement of aquatic organisms is restricted. The presence of weirs and dams within the catchment, while providing suitable habitat for aquatic organisms, also reduces the movement of these species.

LNG Plant and Associated Infrastructure

There are a number of small watercourses that occur within the Curtis Island Industry Precinct. There are no water quality or aquatic ecology data readily available for this area. Further investigations will be undertaken during the EIS on any impacts waterways within or near the project area.



Threatened Aquatic Flora and Fauna Species

There are three aquatic fauna species listed as vulnerable under the EPBC Act found in the freshwater reaches of the project area. Two of these species are listed as vulnerable and one listed as least concern under the NCA. One species is listed as vulnerable on the 2008 IUCN Red List of Threatened Species.

There are many migratory and marine species protected under Commonwealth and State legislation however these are described in the Marine Section below.

There are also threatened EVR flora species located in the study area. Some of these species may be located along the creek and river banks, however potential impacts on these species would be further assessed during the EIS.

3.8.2 Potential Impacts

Gas Fields

The potential impacts to aquatic ecology from the gas fields will be from either directly affecting habitat (during construction) or indirectly through water release during operation.

During construction earthworks may increase the potential for sediment laden water to enter nearby waterways. The removal of vegetation can also cause erosion, so suitable control measures will need to be adopted for works near creeks and rivers.

The operational phase of the Project will produce associated water. The volume of water, treatment requirements and the location and timing of any intended releases will be investigated during the EIS process to ensure that they would not have adverse impacts on aquatic flora and fauna.

Gas Transmission Pipeline

The construction of the pipeline across watercourses has the potential to impact on aquatic flora and fauna if not managed appropriately. The loss of riparian vegetation can impact upon the biodiversity and health of the waterways, and can impact upon water quality. Loss of habitat can impact upon threatened species and increased turbidity can impact upon food resources (Cann 1998; Cogger *et al.* 1993).

LNG Plant and Associated Infrastructure

Construction of the LNG plant has the potential to impact upon a number of small watercourses onsite. Managing erosion and contamination into waterways is a priority and will be addressed in the Project's EMP(s).

Potential impacts associated with the operation of the LNG plant will include the potential for spills and waste disposal. Potential impacts will be further addressed through the EIS assessment process and management measures will be incorporated into the Project's EMP(s).

3.9 Marine and Coastal Ecology

3.9.1 Existing Environment

Marine Protected Areas

Port Curtis is situated within the Gladstone Port Limits. The Port lies outside but directly adjacent to the Great Barrier Reef Marine Park. Port waters below the mean low water mark lie within the Great Barrier Reef World Heritage Area.

Ramsar wetlands are not located within or adjacent to the Curtis Island Industrial Precinct. The closest Ramsar wetlands are Corio Bay and Shoalwater Bay, which are approximately 150 km north of the site.

However, all tidal areas in the vicinity of Gladstone, from a line between Laird Point and Friend Point (southern end of the Narrows), to a line between Gatcombe Head and Canoe Point, including the seaward side of Facing Island and Sable Chief Rocks, and southern Curtis Island west of a line between North Point and Connor Bluff are listed as a nationally important wetland. As described under the Terrestrial Ecology Section above, the Port Curtis wetland system provides important habitat for birds and other marine animals of national significance.

Marine Ecology

Habitat

The primary environmental features of interest in the vicinity of possible development sites are seagrass meadows and mangrove stands and the local system of wetlands that extend along either side of the Narrows and the Targinie Channel waterways in the Port of Gladstone. Extensive unvegetated intertidal banks also occur in the area and these banks provide foraging opportunities for fish at high tide and shorebirds at low tide.

The main areas of seagrass adjacent to the Curtis Island Industry Precinct occur around Pelican Banks/Quion Island and the mainland shore between the Narrows and the mouth of Calliope River. There are six species of seagrass identified within the Port Curtis area.

Extensive mangroves extend along the coastline within the harbour. Fourteen species of mangroves are reported from the Port Curtis region and three species, and are at the southern limit of their distribution.

Key Marine Species

Dugong are associated with seagrass beds in the Port Curtis region but the area does not support large populations.

The endemic flatback turtle nests on the eastern beaches of Curtis and Facing Islands. The South End area of Curtis Island is the key flatback nesting area in the region and is identified nationally as a medium density rookery. Other turtle species, including green, loggerhead and hawksbill, use the waters surrounding Curtis Island for foraging.

The EPBC Protected Matters Database identifies eleven (11) cetacean species that may occur in the Port Curtis region including offshore areas. Three dolphin species are likely to occur adjacent to Curtis Island. There are 33 species of syngnathids (pipefish and pipehorses) that may occur in the region.



Many species of pipefish prefer shallow inshore habitat, which is prevalent adjacent to the proposed industrial precinct.

3.9.2 Potential Impacts

Marine Environment

The construction and operation of an LNG plant has the potential to impact the marine environment in several ways. Primary impacting processes include:

- Disturbance from shipping including boat strike on marine turtles, dugong and cetaceans;
- Lighting disturbance to nesting marine turtles and hatchlings during the construction and operation phases of the development;
- Introduction of marine pests through ballast water, hull fouling and fouling of seawater intake pipes;
- Acoustic impacts on marine megafauna as a result of construction activities, in particular pile driving;
- Impacts from dredging and dredged material disposal, including physical disturbance at the site, and adjacent impacts as a result of short-term elevated turbidities; and
- Discharges.

Disturbance from Shipping

Vessel movements can disturb animals such as dugong, marine turtles and cetaceans from their habitat (Allen and Read, 2000; Lusseau, 2005; Hodgson and Marsh, 2007) or result in injury or death as a result of boat strike. LNG vessels are large and slow moving and will be under pilotage. Marine wildlife stranding reports produced by the EPA do not identify commercial shipping as a source of mortality.

Marine Pests

Harbours on the Queensland Coast currently receive vessels from a large number of countries including Japan, China, Taiwan and Korea. There are existing protocols in place to minimise the risk of marine pest incursions and the early detection of an incursion if one occurs. It is not expected that shipping for the LNG plant will increase the risk of a marine pest incursion.

Lighting

The proposed development will alter the light regime both during construction and operational phases of the Project. Artificial lighting has the potential to disturb nesting female turtles and to disorient hatchlings. Marine turtle nesting occurs at South End on Curtis Island.

Potential impacts on marine environmental values will be considered in the EIS.



3.10 Cultural Heritage

3.10.1 Existing Environment

Indigenous Heritage Values

The project area encompasses a landscape that holds widespread traces of prior Aboriginal use. From previously conducted studies, known sites include scarred trees, scatters of stone artefacts and shell middens.

Shared Heritage Values

The region has a rich history of pastoral, agricultural and mining industries, and a number of shared heritage sites have been identified within Local Government areas contained within the Project's study area. The majority of listed shared heritage sites in the study area are found in the major towns, distant from any planned construction activities. These include public buildings, memorials, houses, churches and cemeteries.

3.10.2 Potential Impacts

Indigenous Heritage Values

Construction activities have the potential to disturb or damage significant areas or objects. Managing the impact of the Project on Aboriginal cultural heritage will be undertaken within the framework of the *Aboriginal Cultural Heritage Act, 2003*. Cultural heritage assessments of the project area will be undertaken with relevant Aboriginal parties to identify Aboriginal cultural heritage. Cultural heritage management plans (CHMPs) will be negotiated with the relevant Aboriginal parties to establish protocols for managing potential impacts to Aboriginal cultural heritage during construction. This may also be done via native title agreements with the relevant parties for land subject to Native Title.

Shared Heritage Values

Construction activities have the potential to disturb or damage previously unrecorded and significant heritage sites and artefacts. Project facilities will be designed and located to minimise the potential impact on identified culturally significant areas listed under the *Queensland Heritage Act, 1992*.

Procedures will be put in place to identify, record and assess heritage items uncovered during construction, so that appropriate management of these items and sites can occur.

3.11 Waste

3.11.1 Existing Environment

The proposed development area is currently relatively undeveloped and is largely rural in character. The main existing waste disposal facilities comprise local Council landfills.



3.11.2 Potential Impacts

General Waste

During construction and operation of the gas plants and transmission pipeline, the following general wastes are likely to be produced:

- General domestic garbage from onsite construction workers;
- Paper, cardboard and timber from packaging;
- Scrap steel and batteries;
- Grey water and sewage from onsite amenities;
- Waste hydrocarbons and oily rags from equipment maintenance and refuelling; and
- Non-hazardous wastes associated with mandatory maintenance shutdowns.

Process Wastes

Gas Plant Emissions and Wastes

A gas plant's purpose is to dehydrate the gas stream. The plant produces a waste water stream which is directed to a constructed wetland for treatment.

The gaseous emissions produced by the gas plant comprise engine exhausts, compressor leakages, and flare emissions. The gases released to the atmosphere comprise raw coal seam methane, nitrous oxides, carbon monoxide, and non-methane hydrocarbons.

Water Treatment Plant Wastes

Water separation is undertaken at the well head with the associated water being transferred to the water treatment plant holding / settlement ponds. The water treatment plant's primary function is to reduce the salts in the associated water stream. The plant contains an integrated membrane system (includes reverse osmosis and ion exchange filters) and which produces highly saline brine (salt content in the order of 30,000 TDS). The brine is then directed to lined evaporation ponds for containment. The remaining waste water is directed to an effluent pond located in close proximity to the facility. The treated water is then available for commercial and beneficial reuse. Options for beneficial reuse and / or disposal were given in Section 2.1.4.

LNG Plant

The air emissions expected to be generated by the operation of the LNG plant include:

- Direct emissions to the atmosphere from the process equipment (e.g. carbon dioxide, carbon monoxide, nitrogen oxides, sulphur dioxide, total organic carbon, and methane);
- Emissions generated during shutdowns, involving small quantities of coal seam gas; and
- Emissions resulting from flaring.

In addition to process wastes, sewage effluent and process waste water may require treatment and appropriate disposal.



Hydrotest water from the LNG storage tanks will need to be discharged prior to plant start-up. This discharge water may contain traces of chemicals and its disposal will be undertaken in accordance with EPA requirements.

Hazardous wastes associated with mandatory maintenance shutdowns, such as used filters, spent molecular sieve desiccant, and spent activated carbon.

The management of these wastes will be addressed in the Project's EMP(s).

3.11.2.1 Stormwater and Effluent Drainage

Gas Plants, Water Treatment Plants, Central Compression Station and Production Wells

Stormwater drainage will be managed to minimise the potential for erosion or scour associated with the facilities. In general, clean water will be diverted from the facilities by way of bunding, drainage or the use of natural topography. Stormwater with the potential to contain waste oil (e.g. from the compression facilities) will be handled through separate drainage systems designed to capture and segregate the waste.

Sewage effluent from the facilities will be captured and treated on site to the required standard. The treated effluent will be released, generally by irrigation, to designated on-site discharge areas away from creeks and water sources.

Solid wastes will be collected and separated into recyclables, inert non-recyclables or contaminated wastes, and disposed of on a regular basis at appropriate local off-site, handling facilities.

LNG Plant

Surface water discharges associated with the LNG plant may be generated from surface runoff caused by rainfall, firewater testing or the wash down of equipment during maintenance. These surface water sources have the potential to export oil or suspended solids from within the plant area. Oily water drains and closed drainage systems will be provided in hydrocarbon/chemical handling areas. Management measures will be outlined in the Project's EMP(s), which will be developed during the EIS process.

3.12 Traffic and Transport

3.12.1 Existing Environment

Gas Fields

Major highways in this area are likely to be used to deliver construction materials, and during operation to transport supplies and equipment needed at the gas fields. The major highways in this area are the Moonie, Warrego and Leichhardt highways. The Roma – Condamine Road also runs through this area. There is also an operational railway which connects Roma to Brisbane and passes through Miles, Chinchilla and Dalby. This may also be used for the transportation of supplies and equipment. There are a number of smaller locally controlled roads which will be used during construction and operational phases of the Project by on site staff and contractors.

Gas Transmission Pipeline

The Dawson and Leichhardt highways and Eidsvold Road are the major connecting roads between the gas fields and Gladstone.



LNG Plant and Associated Infrastructure

There is currently no road access to Curtis Island from the mainland, nor are there any established roads within the industry precinct. Details of future access will be further defined as the design phase progresses.

3.12.2 Potential Impacts and Mitigation Measures

Gas Fields

The gas field development will result in existing roads being upgraded and new access roads being constructed in some locations. The locations for these roads and any required upgrades will be determined during the Project's detailed design phase and the EIS process. The establishment of new and upgraded roads will involve stakeholder (including landowners) consultation and accepted industry practices will be applied.

Gas Transmission Pipeline

Traffic and transport issues associated with the construction of the transmission pipeline will arise from the transport of pipe and other materials, and construction camp facilities to sites along the pipeline corridor. Any predicted increases to traffic movements and heavy vehicle access will be determined as part of the EIS process. The establishment of new and upgraded roads will include engagement with key stakeholder (including landowners).

LNG Plant and Associated Infrastructure

The provision of possible future road access to the proposed industrial precinct on Curtis Island is currently being investigated by the Queensland Government. The impacts associated with the establishment of this road link are being examined to inform that planning, and will be provided with the EIS should this infrastructure be required to support the LNG plant.

3.13 Socio-economic Aspects

3.13.1 Existing Environment

Gas Fields

The gas field development project area encompasses four local authority areas. These are the Dalby, Toowoomba and Roma Regional Councils and the Banana Shire Council. Towns located within the gas field development area include Chinchilla, Kogan, Miles, Condamine, Drillham and Dulacca. The largest towns within, or close to, the development area (and their respective populations) are as follows (taken from the ABS 2006 Census of Population and Housing):

- Dalby (9,778);
- Roma (5,983);
- Chinchilla (3,682); and
- Miles (1,164).

Communities within and adjacent to the development area are facing significant challenges due to regional development led by the resources sector. Land use within the development area is predominantly broad acre cropping, grazing and pastoral activities. The unemployment rate in the



study area has consistently been below the Queensland rate over the past few years with a cyclical labour force due to the seasonality of the agricultural sector.

Gas Transmission Pipeline

The gas transmission pipeline study area (given in Figure 1) passes through Dalby, Banana and Gladstone Regional Councils and is in the vicinity of a number of towns including Wandoan, Taroom, Theodore, Moura, Biloela and Gladstone. The majority of land holdings within the pipeline study area are rural (both leasehold and freehold). Farming enterprises are mainly broad acre cropping and grazing. As previously described, there are limited State Forest and National Park / conservation areas within the pipeline study area, as these were identified as constraints during the selection of the study area.

LNG Plant and Associated Infrastructure

Gladstone is located in the Central Queensland region within the Gladstone Regional Council area.

Gladstone is an important hub in the area, being a major industrial centre for minerals processing and power generation, and is a major export port with associated rail and port infrastructure. Although Rockhampton is the major hub for service industries, the growth in Gladstone has meant that there is an increasing demand for the provision of business and public sector services. The main catalyst for growth is the substantial investment in mineral processing and the increases in coal production in the Bowen Basin which has generated gains in employment and general economic conditions. Given its strong critical mass, Gladstone is well positioned to benefit from future regional growth in coal production, LNG and other exports.

Key statistics of the Gladstone Statistical Subdivision include:

- A population of 42,903 persons;
- 2001 to 2006 population growth of 13.3 %;
- Manufacturing and construction are the two largest employers, accounting for 21 % and 12 % of employment respectively;
- There are eight public and five private primary schools within the Gladstone region;
- There are three public and two private secondary schools located within the Gladstone region;
- Gladstone is serviced by two hospitals within the Gladstone City area; and
- There are a wide array of facilities and services to meet recreational and cultural needs.

3.13.2 Potential Impacts

Gas Fields

The socio-economic impact of gas field development activities is potentially significant due to the size and long-term nature of the Project, as well as cumulative impacts. As part of the EIS, a comprehensive socio-economic assessment of the development area will be conducted to understand any adverse effects on people, their livelihoods and lifestyles, and the economy in the area, and to ensure that any negative impacts are properly managed and positive effects are enhanced. Potential socio-economic impacts may include, but not be limited to:



- Increased demand for construction and operational workforce resulting in shortage of skilled and unskilled labour;
- Influx of construction workforce pushing up costs of housing, accommodation and rents;
- Impact on community values and lifestyle as a result of changed regional dynamics;
- Increase in employment and service and supply opportunities boosts the local economy;
- Increase in demand on social services such as schools, leisure and recreation, medical support, hospitals and police;
- Road safety compromised if increased traffic movements not managed effectively; and
- Competing demand for land resource (e.g. agriculture versus resource use).

Gas Transmission Pipeline

It is expected that the socio-economic impacts will largely be associated with operation of the construction camps and disturbance to landholders and land use during the construction phase. These impacts are likely to be short term in nature and limited to the construction phase of the Project only.

LNG Plant and Associated Infrastructure

The Gladstone region as a whole has experienced substantial growth above the Queensland average, and this Project will contribute significantly to this trend. Due to the high level of activity which may continue in the Gladstone region, assessing the cumulative impacts will be a critical component of the socio-economic impact assessment.

DIP has recently commissioned consultants to prepare a social plan for the Gladstone area. This plan is intended to assess the social needs of the community, and propose solutions to manage the social issues created by rapid industrial growth.

3.14 Hazard and Risk Assessment

3.14.1 Existing Environment

The gas fields and the gas transmission pipeline are located for the most part in rural areas. The gas pipeline within the Gladstone area may traverse designated industrial and rural lands. The LNG plant site investigation area on Curtis Island is also an undeveloped rural area at present. The lands potentially affected by the Project do not exhibit high population densities.

3.14.2 Potential Impacts

Risk assessments, consistent with Australian / New Zealand *Standard for Risk Management AS4360:2004* and *AS2885*, will be conducted to identify and assess potential risks during the construction, operational and decommissioning phases of the Project.

Hazard identification studies will be carried out during the EIS process on each of the three elements of the Project: the gas field development, the gas transmission pipeline, and the LNG plant, to identify the nature and scale of hazards which have the potential to occur if not properly managed. This would examine such items as:

- Construction accidents;



- Pipeline, processing unit or storage vessel rupture or loss of containment, and explosions and fires associated with such incidents;
- Release of liquid gaseous or particulate pollutants or any other hazardous material used, produced or stored on the site;
- Marine collision;
- Release during ship loading;
- The extent of thermal dispersion and resulting hazard / ignition zones following accidental or deliberate release; and
- Natural events such as cyclones, earthquakes, bushfires or local flooding.

Risk analyses and draft risk management plans will be provided in the EIS for the construction and operational phases of the Project.

A risk assessment in accordance with AS2885 will be undertaken for the operation of the gas pipeline. This will include a location analysis of the land use along the route to determine high consequence areas, and a threat analysis of potential hazards. This will enable development of a pipeline risk management strategy for the design, protection and operation of the pipeline to ensure that risks are reduced to the level of as low as reasonably practical.

Risk assessments associated with marine operational activities, while LNG vessels are at berth, during loading and during vessel movements within port limits, will be undertaken to identify all risks and mitigation measures required to ensure safe operational activities associated with LNG vessels.

A preliminary quantitative risk assessment, including consequence modelling, will be carried out during the EIS process for the LNG plant to demonstrate that risks can be adequately contained within site boundaries and that the consequence zones associated with credible worst case scenarios are identified and are compatible with neighbouring (industrial) land uses. A full quantitative risk assessment will be carried out in accordance with relevant national and international standards during the detailed design for the LNG plant. These risk assessments will be carried out in conjunction with relevant Government agencies and the detailed assessment will be provided in support of the petroleum facility licence application and the provisions of the *Dangerous Goods Safety Management Act, 2001* and *Dangerous Goods Safety Management Regulation, 2001*.



4. ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

4.1 Health, Safety and Environmental Management Systems

APLNG will contract the construction and management of the Walloons Gasfields and transmission pipeline to Origin, and the construction and management of the LNG plant to ConocoPhillips.

Origin operates in accordance with its Health Safety and Environment Management System. The HSE management system provides a framework for Origin to continually improve management systems and ensure responsible management practices that minimise any adverse health, safety or environmental impacts arising from activities products or services. The gas fields and gas transmission pipeline will be developed and operated under Origin's management systems.

Specific environmental management strategies for this Project will be delivered through the following measures:

- Development approval conditions, such as those developed for the pipeline licence and petroleum facility licences;
- Conditions developed for the relevant Environmental Authorities issued by EPA;
- Environmental Management Plans developed for the Project, both for the construction and operation phases; and
- Contractual obligations imposed by APLNG on the operators of the elements of the Project.

The Australasia business unit of ConocoPhillips operates in accordance with its *Health, Safety, Environment and Sustainable Development Policy*. Through this policy ConocoPhillips recognises that Health, Safety, Environment and Sustainability are vital to its overall business success. The LNG plant will operate under the same policy and site specific systems.

The LNG plant will comply with the National Occupational Health and Safety Commission documents:

- *Control Of Major Hazard Facilities - National Standard [NOHSC:1014(2002)]*; and
- *National Code of Practice [NOHSC:2016(1996)]*.

Health aspects (such as chemical exposures, noise exposures, heat exposures, ergonomics, and fatigue) will be assessed through an industrial hygiene and exposure assessment programme which will inform the design phases of the LNG plant.

4.2 Climate Change and Greenhouse Policy

APLNG has contracted the operations of the gas fields and transmission pipeline to Origin, and the LNG plant to ConocoPhillips. As such climate change and greenhouse obligations will substantially be managed by these operating entities.

Origin - Origin has for many years now demonstrated a proactive response to climate change and has developed a range of voluntary products for our energy customers including green power, green



gas and carbon offsets. Origin is the largest green energy retailer in Australia with close to 500,000 green energy customers.

Origin has also invested in future renewable technologies including investments in Geodynamics hot rocks technology, wind power and photovoltaic technologies. They have been an active participant in the public policy debate and a leader in Australian carbon trading and sustainability reporting.

As well as beyond compliance activity, Origin has a range of obligations under Commonwealth based regulations aiming to decarbonise the Australian economy. These include a Renewable Energy Target, Greenhouse Challenge, Energy Efficiency Opportunity and the National Greenhouse Energy Reporting Act.

Origin anticipates becoming a substantial liable party in the Carbon Pollution Reduction Scheme.

ConocoPhillips - As part of its commitment to the Commonwealth Government's Greenhouse ChallengePlus Program, ConocoPhillips operates the Darwin LNG Plant under a Cooperative Agreement with the Australian Greenhouse Office (AGO). It is intended that a similar Cooperative Agreement will be developed for the LNG plant during the detailed design phase. ConocoPhillips is well placed to meet any additional requirements that may be required under new greenhouse and energy efficiency opportunity legislation, and impending emissions trading schemes.

ConocoPhillips' Climate Change Position states:

"ConocoPhillips supports a mandatory national framework to address greenhouse gas emissions and has joined the U.S. Climate Action Partnership, a business-environmental leadership group dedicated to the quick enactment of strong national legislation to require significant reductions of greenhouse gas emissions."



5. STAKEHOLDER ENGAGEMENT

5.1 Stakeholder Engagement Principles

APLNG recognises the sustainability of its business necessitates being mindful of, and attentive to, the potential environmental and societal impacts of the Project. Accordingly, APLNG is committed to the principles and practices of stakeholder engagement and consultation with the Project's many stakeholders. Accordingly, APLNG is committed to respecting the rights and interests of individual citizens, relevant organisations and the communities in which the Project will operate.

5.1.1 Stakeholder Engagement Objectives

The key objectives of the stakeholder engagement program will be to:

- Raise awareness about the Project, its potential impacts and timelines amongst stakeholders as early as possible in the process;
- Engage as early as possible in the assessment process to ensure stakeholders have the maximum time possible to consider the Project's potential impacts and potential mitigation strategies;
- Explain the environmental impact assessment (EIS) process and provide an understanding of the regulatory approval process;
- Actively listen to seek an understanding of potential stakeholder concerns, issues and interests;
- Encourage stakeholder involvement and participation in the decision-making process to facilitate enhanced outcomes;
- Foster regular and ongoing communication with stakeholders to ensure issues are captured and project information is made available; and
- Identify opportunities to work together with stakeholders to develop recommended strategies that maximise project benefits and minimise adverse impacts.

A key objective of the engagement process is to build long-term, positive relations between APLNG and stakeholders throughout all stages of the Project including planning, construction, commissioning, operations and final decommissioning.

5.2 Stakeholder Engagement Process

As part of the process for environmental impact assessment under the SDPWO Act, stakeholders have the opportunity to comment about the Project at two critical points in the assessment process. These are at the release of the EIS terms of reference and Draft EIS report. However, APLNG is keen to hear from interested stakeholders at any time.

The stakeholder consultation process shall involve a range of on-going activities to raise awareness about the Project and to seek stakeholder participation in the decision-making process. Relevant stakeholders with an interest in the Project shall be identified and consulted to ensure information is provided to meet their specific interests.



Relevant agencies across the three tiers of government will be consulted in order to strengthen existing relationships or to establish new relationships, and to facilitate the identification of project approval requirements. This would include consulting with head office staff and also representatives of regional offices. Such meetings will cover a range of health, safety and environmental aspects related to the approvals phase, and construction and operational phases.

Engagement shall also be undertaken with the Project's other key stakeholders including individual landholders, Traditional Owner groups, interest groups such as chambers of commerce, rural lobby groups, and environmental and non-government organisations.

To date, the proponents have undertaken preliminary consultation with select government agencies and interest groups in the study area.

A range of two-way communication tools will be implemented to inform stakeholders and to elicit their input into the assessment process. These may include:

- Public meetings and/or information days;
- One-on-one meetings (refer toll free number 1800 526 369);
- A project website;
- Brochures and/or fact sheets;
- Posters;
- Media (print, radio, TV and internet); and
- Establishment of community liaison groups (if appropriate).

As the Project gains momentum, consultation will also be undertaken with other operators and industries in the area to understand potential cumulative effects and identify synergies for input to the EIS process.



6. REFERENCES

Allen, M.C. and Read, A.J. (2000). 'Habitat selection of foraging bottlenose dolphins in relation to boat density near Clearwater', Florida. *Marine Mammal Science*. 16: 815-824.

Cann, J. (1998). *Australian Freshwater Turtles*. Singapore: Beaumont Publishing Pty Ltd.

Cogger, H.G., E.E. Cameron, R.A. Sadler & P. Egger (1993). *The Action Plan for Australian Reptiles*. [Online]. Canberra: Australian Nature Conservation Agency. Available from:
<http://www.environment.gov.au/biodiversity/threatened/action/reptiles/index.html>

Department of Infrastructure and Planning (2008). *Liquefied Natural Gas and Coal Seam Gas Sector Issues Paper - October 2008*.

EnergyQuest (2008). *Energy Quarterly - November 2008*.

Flower LNG Associates (2008). *LNG Market Report for Origin Energy by Andy Flower LNG Associates (July 2008)*.

ABARE (2008). *Australian Commodities, December Quarter*. Vol 15, No. 4.

Hodgson, A.J. and Marsh, H. (2007), 'Response of dugongs to boat traffic: The risk of disturbance and displacement'. *Journal of Experimental Marine Biology and Ecology*. 340: 50-61.

Lusseau, D. (2005) Residency pattern of bottlenose dolphins *Tursiops* spp. In Milford Sound, New Zealand, is related to boat traffic. *Marine Ecology Progress Series*. 295: 265-272.

Marsh, H. and Lawler, I. (2001) *Dugong Distribution and Abundance in the Southern Great Barrier Reef Marine Park and Hervey Bay: Results of an Aerial Survey in October-December 1999*. Great Barrier Reef Marine Park Authority Research Series Publication 70.



7. ABBREVIATIONS AND GLOSSARY OF TERMS

ABBREVIATIONS

AGO	Australian Greenhouse Office
APLNG	Australia Pacific LNG Limited
ASS	Acid sulphate soils
ASX	Australian Securities Exchange
ABARE	Australian Bureau of Agriculture and Resource Economics
A\$	Australian dollars
CASA	Civil Aviation Safety Authority
CSG	Coal seam gas
DIP	Department of Infrastructure and Planning
DMR	Department of Main Roads
DNRW	Queensland Department of Natural Resources and Water
EIS	Environmental impact statement
EMP	Environment management plan
EPA	Environmental Protection Agency (Qld)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act, 1999</i> (Cth)
ERA	Environmentally relevant activity
EVR	Endangered, vulnerable and rare
FEED	Front end engineering design
FID	Financial investment decision
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
GPC	Gladstone Port Corporation Limited
IAS	Initial advice statement
ILUA	Indigenous land use agreement
LAT	Lowest astronomical tide
LNG	Liquefied natural gas



MOF	Marine offloading facility
Mtpa	Million tonnes per annum
NES	National environmental significance
NICNAS	National industrial chemicals notification and assessment scheme
NO₂	Nitrogen dioxide
NSAI	Netherland, Sewell and Associates Inc
NTA	<i>Native Title Act, 1993</i>
PNG	Papua New Guinea
PJ	Petajoule
RE	Regional Ecosystem
ROW	Right of way
SO₂	Sulphur dioxide
SDPWO Act	<i>State Development and Public Works Organisation Act, 1971 (QLD)</i>
TDS	Total dissolved solids
TEC	Threatened ecological community
TOC	Total organic content
TOR	Terms of reference
US\$	United States dollars
WCM	Walloon coal measures



GLOSSARY

Acid Sulfate Soils	Naturally occurring soils, sediments or organic substrates (e.g. peat) that are formed under waterlogged conditions. These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. In an undisturbed state below the water table, acid sulfate soils are benign. However if the soils are drained, excavated or exposed to air by a lowering of the water table, the sulfides will react with oxygen to form sulfuric acid.
Associated Water	Underground water taken by a petroleum tenure holder from a gas well. Examples include underground water necessarily or unavoidably taken during the drilling of a gas well or water observation bore; or during gas production.
Berth Pocket	A location in a port or harbour used specifically for mooring vessels, and where loading or unloading occurs.
Bioregion	An ecologically and geographically defined area smaller than a "realm" or "ecozone". Eco-regions cover relatively large areas of land or water, and contain characteristic, geographically distinct assemblage of natural communities and species. The biodiversity of flora, fauna and ecosystems that characterise an eco-region tend to be distinct from that of other eco-regions.
Catchment	The term used to describe the area which is drained by a river. It is sometimes called the river basin or watershed. The catchment is the most significant factor determining the amount or likelihood of flooding.
Climate Change	Any long-term significant change in the "average weather" that a given region experiences. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.
Coal Seam Gas	A form of natural gas extracted from coal beds.
Contingent Resources	Those quantities of hydrocarbons which are estimated, on a given date, to be potentially recoverable from known accumulations, but which are not currently considered to be commercially recoverable. Contingent resources may be of a significant size, but still have constraints to development. These constraints, preventing the booking of reserves, may relate to lack of gas marketing arrangements or to technical, environmental or political barriers.
Controlled Action	A term used under the <i>Environment Protection and Biodiversity Conservation Act, 1999</i> to determine whether an action is likely to have an impact on matters of national environmental significance. If a project is declared a 'controlled action', development approval is required from the Minister for Environment, Heritage and the Arts.
Cultural Heritage	The legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.
Economic Impact Assessment	Assessment of the measured effect on the economy of a region of an impacting agent.



Ecosystem	A natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment.
Emissions	Release of pollutants to air.
Environmental Impact Assessment	The process used to assess the environmental impact of a proposed development.
Environmental Impact Statement (EIS)	The information document prepared by the Proponent when undertaking an environmental impact assessment. It is prepared in accordance with terms of reference prepared or approved by Government.
Environmental Management Plan (EM Plan)	A document developed by Proponents during a project's planning and design. An EM Plan provides life-of-project control strategies in accordance with agreed performance criteria for specified acceptable levels of environmental harm. It may continue through the whole life of a project (e.g. preconstruction, construction, operation and decommissioning).
Fauna	Animal life.
Flora	Plant life.
Gas Reserves – 2P	Proved plus probable reserves
Gas Reserves – 3P	Proved plus probable plus possible reserves
Greenhouse Gas	The gases present in the earth's atmosphere which reduce the loss of heat into space and therefore contribute to global temperatures through the greenhouse effect.
Hazard	A hazard is usually a potentially harmful situation, although not usually the harmful event itself. Once the incident has started it is classified as an emergency or incident.
Hydrocarbons	An organic molecule containing hydrogen and carbon; the major component of petroleum.
Initial Advice Statement	A document prepared for a proposed project that is submitted to the Coordinator General so that a decision can be made as to whether the project should be declared a 'significant project for which an Environmental Impact Statement is required' under Section 26 (1) (a) of the <i>State Development and Public Works Act, 1971 (Australia)</i> .
Liquefaction	Process of liquefying gas through cooling to approximately -160 °C followed by flashing to a low pressure.
Liquefied Natural Gas	Natural gas that has been converted to liquid form for ease of storage or transport. Liquefied natural gas takes up about 1/600 th the volume of natural gas at a stove burner tip. It is odorless, colorless, non-corrosive, and non-toxic. When vaporized, it burns only in concentrations of 5 % to 15 % when mixed with air. The density of LNG is roughly 0.41 to 0.5 kg/L at -164 °C.
LNG train	The purification and liquefaction components of an LNG facility. LNG facilities consist of one or more LNG trains.
Pilotage	The process of guiding vessels through port waters by a mariner.
NSAI	Netherland, Sewell and Associates Inc, an Internationally recognised industry expert in reserves certification.



Receptors	Sensitive component of the ecosystem that reacts to, or is influenced by environmental stressors.
Regional Ecosystem	Communities of vegetation that are consistently associated with a particular combination of geology, land form and soil in a bioregion.
Rehabilitation	The process of environmental restoration after some process (business, industry, natural disaster etc.) has damaged it.
Remnant Vegetation	Vegetation that is mapped by Department of Natural Resources and Water (DNRW) as being within a remnant endangered regional ecosystem, a remnant of concern regional ecosystem, or a remnant not of concern regional ecosystem map. Vegetation remaining after an area has been cleared or modified.
Risk	The potential impact of an event, determined by combining the likelihood of an event occurring, and the consequence if it were to occur.
Stakeholder	A person or organisation with an interest or stake in a project.
Sweet Spot	A CSG resource that has a relatively higher gas content, permeability and coal thickness resulting in superior gas flow rates and reserves recovered per well compared to surrounding areas and comparable reserves internationally.
Topography	A description of the surface features of a place or region.
Wetland	The land area alongside fresh and salt waters, that is flooded all or part of the time.



Appendix A Company Policies

- *ConocoPhillips Australasia Business Unit – Health, Safety, Environment and Sustainable Development Policy.*
- *Origin Energy – Health, Safety and Environment Policy*



AUSTRALASIA BUSINESS UNIT

Health, Safety, Environment & Sustainable Development Policy

In the Australasia Business Unit our people are our most valued asset and management is committed to providing a safe and secure workplace for them to work.

We are committed to conducting our operations in an environmentally sound manner and in harmony with the surrounding community.

We strive to be recognized as a valued and welcomed member of the community in which we operate.

We are collectively and individually responsible for maintaining a safe work environment

To achieve this commitment, we support the following fundamental principles through our demonstrated actions:

- All injuries and releases can be prevented.
- No work is so urgent or important that we cannot take the time to do it safely.
- All employees and contractors have the authority and the responsibility to stop work or shutdown equipment, if concerns exist about safety, security, the environment or property loss, without regard to loss of production.
- Working safely is a condition of employment and each employee and contractor is responsible for their own safety and the safety of those around them.
- Responsibilities are clearly communicated and all employees and contractors are held accountable.
- Employees and contractors are involved in comprehensive HSE audits and incident investigations to seek timely corrective action.
- Sustainability is a factor in our ongoing operations as well as in planning and execution of future projects.
- Business is conducted in a way that contributes to economic growth, a healthy environment and vibrant communities in the areas we operate.
- Employee participation and ownership in community activities is encouraged.

The success of the Australasia Business Unit is contingent on the success of carrying out this commitment to our employees, our contractors and the community in which we operate.

Joe Marushack
President

Laurie St Aubin
Exploration Manager

David Corman
Vice President Finance

Michael Hatfield
Darwin Area Manager

Alison Smith
Human Resources Manager

Mark Nelson
Sunrise Development
Growth Manager

Mark Tompkins
VP Operations, Drilling &
Supply Chain

Richard D'Ardenne
VP Capital Projects

Mike Nazroo
VP Commercial

Robin Antrobus
VP External Relations

David Bridges
VP Legal

Mark Sherwill
Timor Leste Country Manager

Steve Godby
HSE Manager



Policy

Health, Safety & Environment

At Origin Energy, we value the wellbeing of our employees, contractors, customers, the communities in which we operate and the environment. We are committed to responsible management practices that minimise any adverse health, safety or environmental impacts arising from our activities, products or services.

We have in place a Health, Safety and Environmental management system for all our activities that drives continual improvement. The HSE Management System outlines HSE accountabilities to implement this Policy and requires that we:

- Identify and manage risks to as low as reasonably practicable where they have the potential to cause an accident, injury or illness to people, or unacceptable impacts on the environment or the community;
- Provide safe work places and systems of work, empower employees and contractors to address unsafe or hazardous situations and carry out their work in a manner that does not present a risk to themselves, others or the environment;
- Support the recovery and rehabilitation of employees in the event of work related injury or illness;
- Set objectives and targets which promote the efficient use of energy and resources, the minimisation of wastes and emissions and the prevention of pollution;
- Ensure compliance with relevant HSE legal requirements and other commitments;
- Require Contractors to manage HSE using standards and practices that accord with this Policy;
- Regularly review and report HSE performance.

In implementing this Policy we will engage with our employees, contractors, suppliers, business partners, customers and Government and communicate expectations to all persons working with or on behalf of Origin Energy.

Accountabilities

The Board is responsible for establishing and overseeing the Company's commitment to manage HSE in accordance with this Policy and for monitoring the performance of the Company with respect to its implementation.

The Managing Director is responsible for the implementation of the HSE Management System to ensure the commitments made in this Policy are being met.

Grant King
Managing Director
September 2007
Review date September 2009