# Wallumbilla Gas Treatment Facility

# Initial Advice Statement

January 2012

## GLNG Operations Pty Ltd

*Preliminary Image: 250 TJ/day capacity.*

Santos
GLNG Project

GLNG is a Santos PETRONAS Total KOGAS project.

Santos | PETRONAS | TOTAL | KOGAS

PARSONS BRINCKERHOFF

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# Glossary

| Term | Definition |
|---|---|
| AGL | Australian Gas Light company |
| ASX Ltd | Australian Securities Exchange |
| BLEVE | Boiling liquid expanding vapour explosion |
| $CO_2$ | Carbon Dioxide |
| CRWP | Comet Ridge to Wallumbilla Pipeline |
| CSG | Coal Seam Gas |
| EA | Environmental Authority |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| EHSM | Environment, Health and Safety Management system |
| EP Act | *Environmental Protection Act 1994* |
| ERA | Environmentally Relevant Activity |
| GAB | Great Artesian Basin |
| GLNG | Gladstone Liquefied Natural Gas |
| GTP | Gladstone Gas Transmission Pipeline |
| HAZOPS | Hazard and operability studies |
| IAS | Initial Advice Statement |
| KOGAS | Korean Gas Corporation |
| LNG | Liquefied Natural Gas |
| MAR | Managed aquifer recharge |
| MNES | Matters of National Environmental Significance |
| Mtpa | Million tonnes per annum |
| NGL | Natural Gas Liquids |
| NOx | Nitrogen oxides |
| PCS | Pipeline Compressor Station |
| PETRONAS | Petroleum Nasional Berhad |
| PGPS Act | *Petroleum and Gas (Production and Safety) Act 2004* |
| PPL | Petroleum pipeline license |
| Project | Development of the WGTF |
| Santos | Santos Limited |
| SDPWO Act | *State Development and Public Works Organisation Act 1971* |
| TJ | Terajoule |
| WCS | Wallumbilla Compressor Site |
| WDS | Wallumbilla Delivery Station |
| WGTF | Wallumbilla Gas Treatment Facility |

# Executive summary

This Initial Advice Statement (IAS) has been prepared for the development of the Wallumbilla Gas Treatment Facility (Project) which complements the existing and previously approved Gladstone Liquefied Natural Gas (GLNG) project. The purpose of this IAS is to:

- provide the Queensland Department of Environment and Resource Management (DERM) with sufficient information regarding the Project and its potential environmental, social and economic impacts to determine whether to accept an application to prepare a voluntary Environmental Impact Statement (EIS) under the *Queensland Environmental Protection Act 1994* (EP Act)
- inform key Queensland Government departments and other statutory stakeholders about the proposed Project
- enable the draft Terms of Reference to be developed for the Project EIS.

The proponent, GLNG Operations Pty Ltd, herein referred to as Santos GLNG, is acting on behalf of the shareholders which are four of the world's leading petroleum and gas companies namely Santos, PETRONAS, Total and KOGAS. In proposing the development of the Wallumbilla Gas Treatment Facility (the Project), the proponent seeks to ensure appropriate facilities are in place in support of the GLNG project as well as the domestic gas market.

The Project will be located at the existing Wallumbilla Hub, a central transmission point that facilitates the supply of natural gas in Queensland's south-west, approximately 50 km east south-east of Roma. The Project is proposed to be developed on a leasehold lot adjacent to an existing compressor station owned by Santos, amongst other operating gas infrastructure on adjacent lots.

The Project's main infrastructure components to be developed in two equal stages include:

- two gas processing trains complete with gas compression facilities
- storage for stabilised natural gas liquids
- gas turbine alternators for facility power supply, combined with grid connection
- flaring facilities for safety of operation
- control room and amenities.

Given the existing petroleum facilities at the proposed site, the Project is not expected to have any significant adverse impacts on local and regional environmental and social values. The Project will provide economic benefits to Queensland at a local, regional and state level.

A range of approvals will be required for the Project. The Project will require a petroleum facility licence under the *Petroleum and Gas (Production and Safety) Act 2004*, and an Environmental Authority (EA) for Environmentally Relevant Activities (ERAs) Hydrocarbon gas refining – coal seam gas and electricity generation under the *Environmental Protection Act 1994*. Further ERAs may be required as the detailed Project definition is developed.

Initial investigations indicate the Project will not impact on any Matters of National Environmental Significance, and therefore referral of the Project to the Commonwealth Government under *Environmental Protection and Biodiversity Conservation Act 1999* is not anticipated.

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# 1. Introduction

## 1.1 Purpose and scope of the initial advice statement

This Initial Advice Statement (IAS) has been prepared for the development of the Wallumbilla Gas Treatment Facility (Project) which complements the existing and previously approved Gladstone Liquefied Natural Gas (GLNG) project. The purpose of this IAS is to:

- provide the Queensland Department of Environment and Resource Management (DERM) with sufficient information regarding the Project and its potential environmental, social and economic impacts to determine whether to accept an application to prepare a volluntary Environmental Impact Statement (EIS) under the *Queensland Environmental Protection Act 1994* (EP Act)
- inform key Queensland Government departments and other statutory stakeholders about the proposed Project
- enable the draft Terms of Reference for the preparation of an environmental impact statement to be developed for the Project.

The scope of the IAS encompasses a range of aspects of the Project and provides information on:

- the proponent
- the purpose and proposed operations
- the costs and benefits
- existing environmental factors
- potential environmental impacts
- any identified measures for environmental management and mitigation.

## 1.2 Project proponent

GLNG Operations Pty Ltd, herein referred to as Santos GLNG, is undertaking the development of the Project on behalf of the same partnership between the international petroleum and gas corporations of the GLNG project, namely Santos (30%), PETRONAS (27.5%), Total (27.5%) and Kogas (15%). Given the prominence of Santos in the partnership, the GLNG Project is referred to as the Santos GLNG Project.

The GLNG project is one of Australia's major LNG projects involving the development of approximately 2,650 exploration and production wells and a 420 km underground pipeline connecting CSG fields with a 10 million tonnes per annum (Mtpa) capacity LNG facility on Curtis Island. On 28 May 2010, GLNG became Australia's first major CSG to LNG project to receive environmental approval from the Queensland Coordinator-General.

Santos has been in the Australian energy sector since 1954 as an oil and gas exploration and production company and is today one of the country's leading gas producers, supplying Australian and Asian

customers. In 2010, Santos' total production was 49.9 million barrels of oil equivalent. The company is listed on the Australian Securities Exchange (ASX Ltd) and has approximately 2,400 employees working across its operations in Australia and Asia, as well as three offices in Queensland, namely Brisbane, Gladstone and Roma.

Santos is an Australian oil and gas exploration and production company with operations in every major Australian petroleum province, as well as interests in Indonesia, Papua New Guinea, Vietnam, India and Tajikistan. Santos is Australia's largest onshore domestic gas producer, supplying sales gas to all mainland Australian states and territories, ethane to Sydney, and oil and other liquids to domestic and international customers. Santos' market capitalisation makes it one of Australia's top 25 listed companies.

PETRONAS (Petroliam Nasional Berhad) is a Malaysian based oil and gas corporation ranked among FORTUNE Global 500's largest corporations in the world, with extensive experience in LNG currently operating the world's largest integrated LNG facility in Bintulu, Sarawak, which has a total capacity of around 23 Mtpa from eight LNG trains.

Total is the fifth largest publicly-traded integrated international oil and gas company and a world-class chemicals manufacturer. Total operates in more than 130 countries, has over 96,000 employees and is a leading player in the international LNG sector active in almost all LNG producing regions and main LNG markets.

KOGAS (Korean Gas Corporation) is currently the world's largest LNG importer purchasing 26 million tonnes of LNG annually. KOGAS operates three LNG import terminals in Korea and a nationwide pipeline network spanning over 2,700 km.

The combined experience and demonstrated capability and involvement in major international petroleum and gas projects, as well as extensive experience within the Australian gas industry, highlights the proponent's expertise in the natural gas sector and commitment and ability to further develop Australia's potential for a cleaner future for all Australians.

## 1.3 Project rationale

Santos GLNG is proposing to use CSG gas from underground storage and some of its CSG production may need to be transported through non-CSG dedicated pipelines. In addition, Santos GLNG is proposing to use other non-CSG gas sources as supplementary feed gas to the LNG facility at Gladstone, and other LNG facilities which may develop in future. Other gas sources could include conventional gas from existing Santos facilities such as Moomba and Ballera, as well as gas from other potential suppliers.

Gas supplied to Santos GLNG is to be sent to Gladstone via the Gladstone Gas Transmission Pipeline (GTP). The LNG facility has been designed to receive only CSG specification gas which does not contain heavy hydrocarbons and other impurities such as sulphur species (hydrogen sulphide, carbonal sulphide) which means that gas which does contain these constituents must be treated prior to entering the GTP.

The proposed WGTF is designed to be scalable with a maximum treatment capacity up to 500 TJ/day of standard pipeline specification gas to be treated to a specification suitable to be supplied to the GLNG plant at Gladstone. This facility is planned to be developed in two stages with each having an initial capacity of 250 TJ/d.

Santos GLNG strongly believes the Project will complement the long-term development of gas supply in Queensland. The Project will be designed to handle a range of expected feed gas compositions.

## 1.4 Related projects

### 1.4.1 GLNG Project

The GLNG project is a partnership between Santos (30%), PETRONAS (27.5%), Total (27.5%), and KOGAS (15%). The key components of the project include the construction and operation of 2,650 exploration and production wells in the Bowen and Surat basins around Roma, a 420 km pipeline from the Fairview gas fields to Gladstone, and a LNG plant and export facility on Curtis Island off Gladstone. The project will initially produce 7.8 Mtpa of LNG, with a maximum potential of 10 Mtpa. The GLNG project will result in more than 5,000 jobs during construction and about 1,000 ongoing positions in the operational phase.

The Queensland Government granted environmental approval for the project on 28 May 2010, and the Federal environmental approval was received on 22 October 2010. The federal approval is conditional on GLNG maintaining the highest environmental standards in constructing and operating the project, including comprehensive water management requirements and measures to protect biodiversity.

The final investment decision for the 2-train 7.8 Mtpa GLNG project was made on 13 January 2011. Construction commenced in 2011 with first LNG shipment scheduled for export from 2015.

### 1.4.2 Wallumbilla Hub

The Wallumbilla Hub (the Hub) is an important Queensland gas hub which serves several high pressure gas pipelines in the Surat Basin including transmission pipelines which connect to major demand hubs such as Mt. Isa, Gladstone and Brisbane, as well as facilitating the transmission of gas to South Australia and New South Wales (refer to Figure 1.1).

A number of gas pipelines connect to various facilities located at the Hub. The site hosts a large amount of above and underground gas related infrastructure. Facilities include the Wallumbilla Compressor Station (WCS) owned and operated by GLNG Operations Pty Ltd, a liquefied petroleum gas (LPG) facility (operated by AGL) and a number of pipeline interconnect/metering terminals operated by companies including Alinta Queensland, Epic Energy, AGL Petroleum Pipelines, and Origin CSG Pty Limited.

### 1.4.3 Gas Transmission

As outlined in Section 1.3 Project rationale, it is not the primary purpose of the WGTF to produce hydrocarbon products of its own accord. The WGTF will process to a desired gas specification, various gas resources which have been supplied from a number of potential upstream sources, each the subject of independent environmental and regulatory approvals. Those resources produced upstream of the proposed WGTF are done so independently of the development of the WGTF and are not reliant on the development of the WGTF. Likewise existing, under construction and proposed upstream pipelines are independent projects and are not reliant on the development of the WGTF.

Gas supplies processed within the proposed WGTF can be transported downstream via existing, under construction and proposed pipeline networks to the LNG facility in Gladstone or elsewhere. Furthermore, the downstream pipelines are subject to existing or future independent environmental approvals. As outlined in 1.4.1 above, the GLNG LNG facility is the subject of an existing environmental approval and is not reliant on the development of the WGTF.

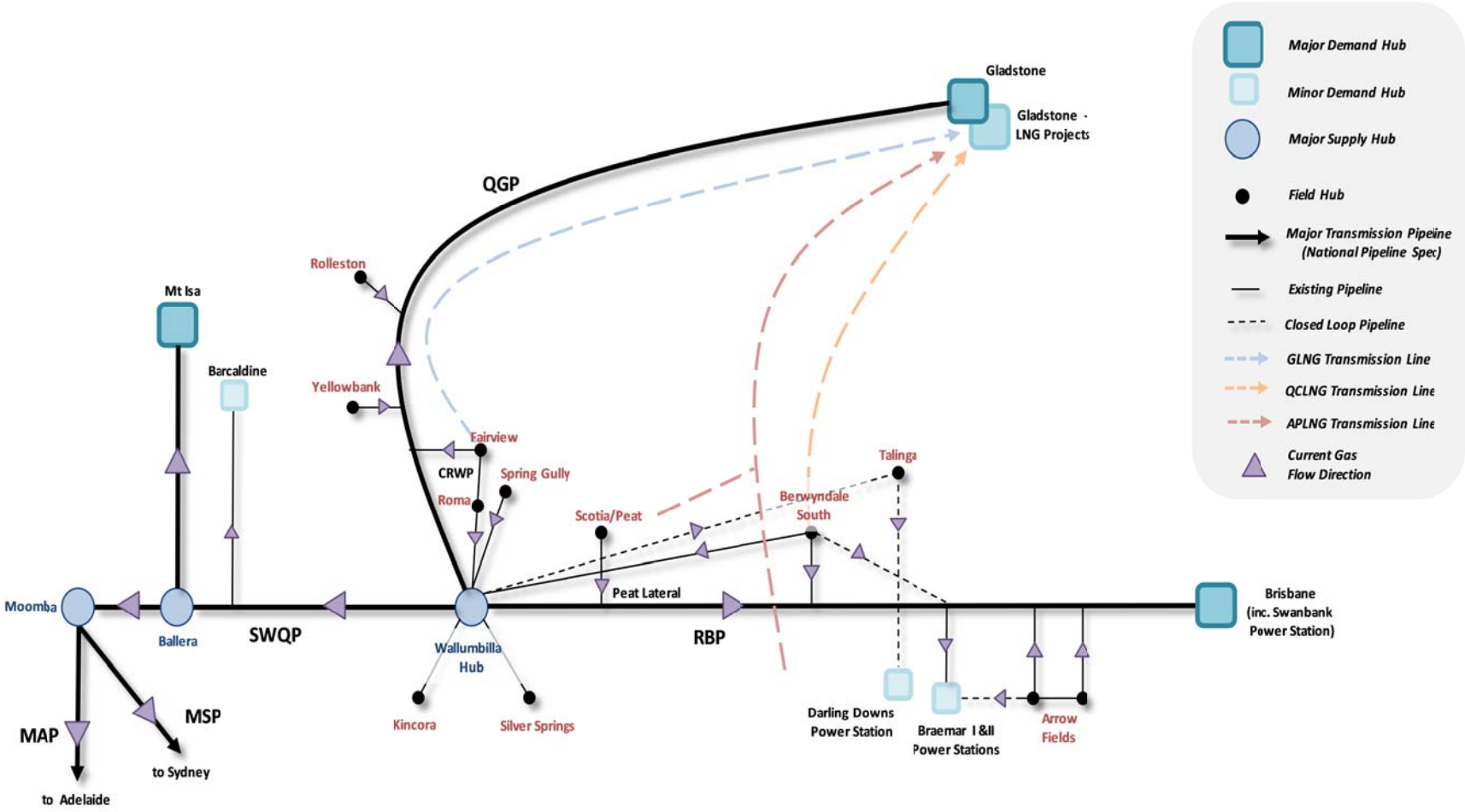


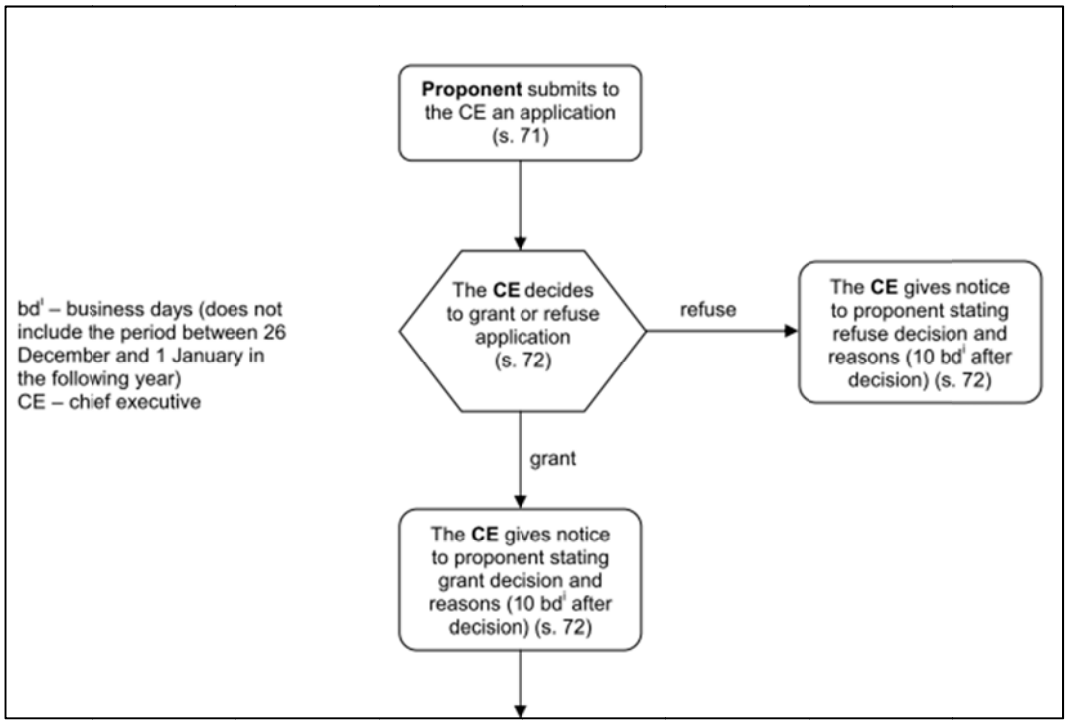

Figure 1.1 Gas pipeline network

## 1.5 Approvals required for the Project

This section outlines the regulatory approvals process of the proposed Project required at both State and Commonwealth levels of Government.

### 1.5.1 State regulatory approvals process

This IAS provides information in accordance with Section 71 of the Queensland EP Act, to the Chief Executive (CE) of DERM to support an application to prepare a voluntary EIS for the Wallumbilla Gas Treatment Facility. The application process to voluntarily prepare an EIS under the EP Act is shown in Figure 1.1.




Source: DERM 2011a

Figure 1.2 Application process to voluntarily prepare an EIS

If the application is approved by DERM the general EIS process prescribed in the EP Act will apply to the Project. The EP Act Statutory process involves:

- Santos prepares draft Terms of Reference for the Project (s.41)
- Chief Executive prepares a Terms of Reference notice for the Project (s.42)
- Chief Executive publishes Terms of Reference notice for comment (s.43)
- Chief Executive issues Final Terms of Reference for the Project (s.46)
- Santos prepares EIS in accordance with the Terms of Reference
- Santos submits EIS to the Chief Executive (s.47)

- Chief Executive decides whether the EIS addresses the final Terms of Reference and may proceed to public notification (s.49)
- Santos attends to public notification of the EIS for comment (s.51)
- Public make submissions on the EIS to the Chief Executive (s.54)
- Chief Executive provides copies of submissions to Santos and Santos prepares a response (s.56)
- Chief Executive prepares an Assessment Report making a recommendation whether to approve, approve with conditions, or not approve the Project (s.57).

The purpose of an EIS is to report the findings of an environmental impact assessment that involves examining the potential significance of direct and indirect environmental, social and economic impacts of the Project, with appropriate mitigation measures also provided.

The Project will require a licence for a 'petroleum facility' under Section 446 of the *Petroleum and Gas (Production and Safety) Act 2004*. A petroleum licence may only be issued after the granting of the relevant EA.

As such the Project will require an environmental authority (EA) as a petroleum activity (Chapter 5A) under the *Environmental Protection Act 1994* (EP Act). The EA will include Environmentally Relevant Activities (ERAs). Through initial scoping the following ERA's are applicable to the Project, however variation may exist as the Project develops:

- hydrocarbon gas refining – ERA 9
- **chemical storage -** ERA 8b
- electricity generation - ERA 14.

### 1.5.2 Commonwealth regulatory approvals process

Initial investigations indicate the Project will not impact on any Matters of National Environmental Significance, and therefore referral of the Project to the Commonwealth Government under *Environmental Protection and Biodiversity Conservation Act 1999* is not anticipated.

Refer to Appendix A for the preliminary assessment of EPBC matters.

# 2. The nature of the Project

## 2.1 Background

The area known as the Wallumbilla gas hub is an existing infrastructure development located south of the town of Wallumbilla and east south-east of Roma. The Hub is an industrial development of gas handling facilities which collectively monitor, measure, compress and treat gas which is transported in and out of the hub by a number of gas transmission pipelines. The infrastructure is owned by a number of companies and is located on independently operated sites which abut each other. The Project proponents operate one of these sites, being the location of the Wallumbilla Compressor Station, and seek to expand the functionality of the site through the development of additional gas processing and infrastructure facilities on vacant land adjacent to the existing compressor facility.

The Wallumbilla Compressor Station (WCS) compresses gas which may ultimately supply the GLNG gas transmission pipeline and the LNG facility at Gladstone. The latter facility has been designed specifically for coal seam gas (CSG), consequently gas supplied from the existing pipeline network cannot be fed directly to the GLNG facility as the gas may contain constituents in the form of heavy hydrocarbons which may interfere with the operability of the LNG facility.

The Project will provide the proponents with the capability to treat standard pipeline specification gas and CSG from storage reservoirs to meet the specifications of the GLNG pipeline and LNG facility at Gladstone, and other LNG facilities as required.

## 2.2 Project location

The Project is proposed to be constructed within Lot 33 on SP212840 (herein referred to as the Project site) at the Wallumbilla Hub, approximately 12 km south of the township of Wallumbilla and 50 km east south-east of Roma, Queensland. The Project location is shown on Figure 2.1.

The proposed development will take place on an approximately 15.5 ha area of vacant land held jointly by Santos GLNG Pty Ltd, Total GLNG Australia, PAPL (Downstream) Pty Limited and KGLNG Liquefaction Pty Ltd. The Project will be directly adjacent to the WCS and the Wallumbilla Metering Station (WMS) facilities within the Wallumbilla Hub, the location of which is shown in Figure 2.1.

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**Wallumbilla Gas Treatment Facility IAS**

Figure 2.1
Project Location

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## 2.3 Project tenure and tenements

The Project site is located on leasehold land (Lot 33, SP212840). This land is covered by the petroleum licence PL8 held by Santos QNT Pty Ltd and PAPL (Upstream) Pty Ltd.

Additionally, the following petroleum pipeline licences (PPLs) are also located within and adjacent to the Project:

- PPL3, granted on 5 August 1976 to Oil Investments Pty Limited
- PPL2, granted 21 December 1967 to APT Petroleum Pipelines Pty Limited
- PPL90, granted 15 April 2003 to Oil Company of Australia (Moura) Transmissions Pty Ltd
- PPL118 (Fairview PCS to Wallumbilla Trunkline), granted on 19 May 2006 to Fairview Pipeline Pty Ltd
- PPL134, granted on 8 September 2008 to Origin Energy Wallumbilla Transmissions Pty Ltd
- PPL123, granted 30 August 2008 to APA Pipelines Investments (BWP) Pty Ltd
- PPL145, applied by APA Pipelines (QNSW) Pty Ltd
- PPL140, applied by ERM Power Pty Ltd.

## 2.4 Proposed operations

The WGTF Project will involve the construction and operation of gas treatment and processing facilities which will be based around modular cryogenic natural gas liquid recovery units.

The treatment process is likely to require the staged development of two gas processing and compression trains each of approximately 250 TJ/day capacity to undertake the following key steps for purification of CSG:

- upstream feed gas pre-treatment (mercury removal and dehydration)
- cryogenic hydrocarbon separation (removal of components other than methane from the feed gas stream)
- treated gas (residue) compression to pipeline pressures
- recovery and treatment of liquid hydrocarbons and separation of light natural gas liquids from heavier C5+ components, thus producing a stabilised hydrocarbon condensate product.

In addition to the gas treatment trains, other key components of the Project likely to be required include:

- storage for the stabilised condensate stream separated from the feed gas
- gas turbine alternators providing electrical power requirements for the facility through utilisation of the non-methane natural gas liquids

- hot oil system (to heat gas for regenerating dehydration units)
- air compression system (providing plant and instrument air)
- nitrogen generation plant (for inerting, drying and purging process plant)
- fire water system
- flare and vent system (to safely handle the discharge of flammable gases and liquids)
- oily water system (to treat process water and potentially contaminated runoff)
- potable and service water system.

As a result of the gas purification process, natural gas liquids (NGLs) will be produced and will be used as a hydrocarbon fuel source in gas-fired power generation to be located on-site. Specific details of the generating capacity have not been established although it is likely that power generation will be limited to that necessary to utilise the surplus non-methane NGLs.

The preliminary conceptual layout of the WGTF is provided in Figure 2.2, together with its location relative to the WCS and WMS.

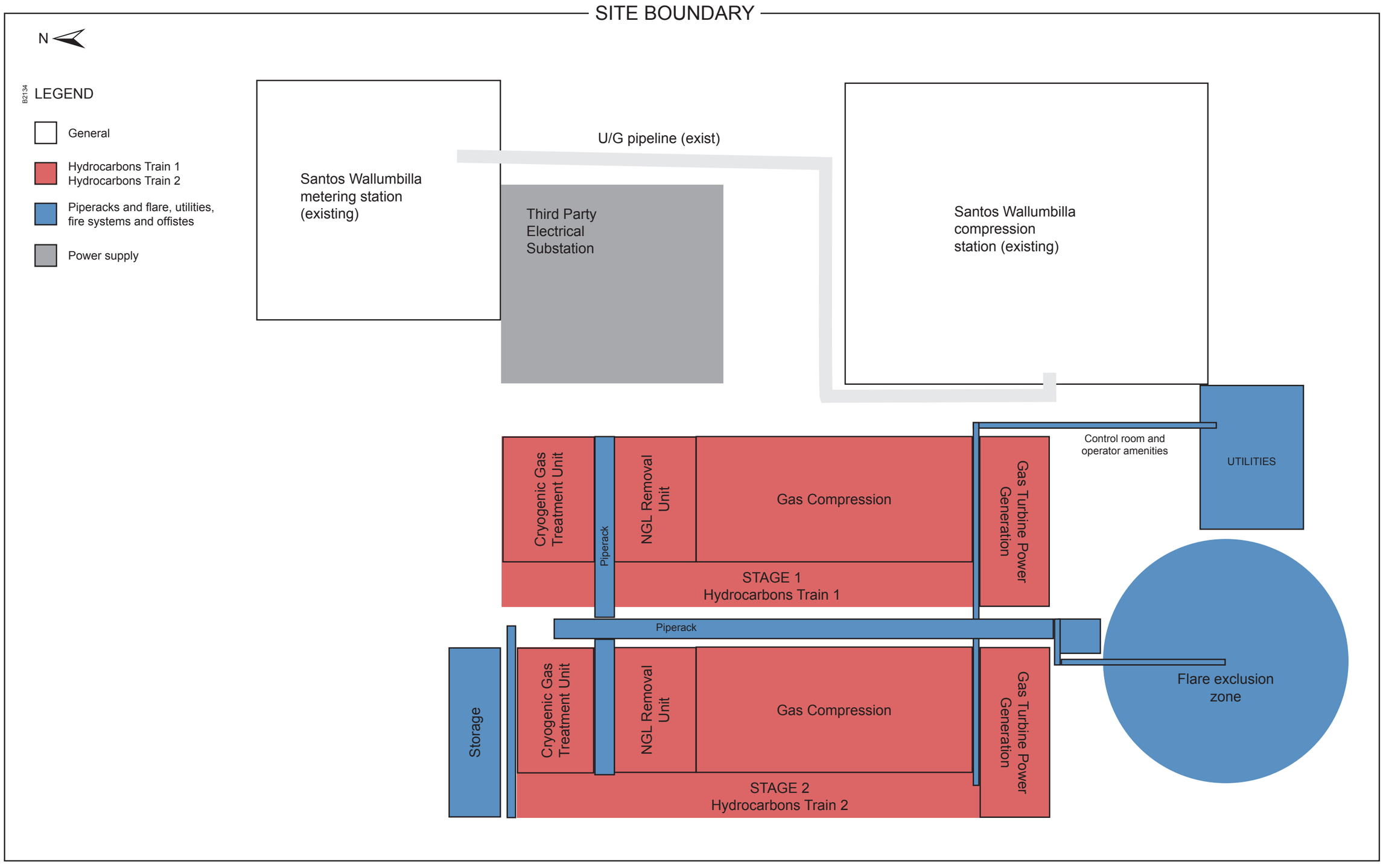


Figure 2.2
Conceptual General Arrangement
Wallumbilla Gas Treatment Facility

## 2.5 Infrastructure requirements

### 2.5.1 Water supply

Water requirements for the WGTF will be minimal and are likely to be sourced from local supplies which are generally sourced from aquifers such as the Gubberamunda Sandstone aquifer.

A Managed Aquifer Recharge (MAR) scheme is proposed within Santos GLNG Roma Shallow Gas Project Area with the aim of recharging the Gubberamunda Sandstone aquifer using treated CSG water. MAR is the process of adding a water source, such as treated CSG water or recycled water to aquifers under controlled conditions for withdrawal at a later date. Santos GLNG is currently assessing the feasibility of this scheme which will not only restore aquifer pressure depleted by local pumping but protect the Gubbermunda Sandstone aquifer from potential impacts associated with depressurisation of the coal seams below.

The WGTF can potentially utilise a locally sourced water supply from the Gubberamunda Sandstone aquifer, which has been essentially recharged by the Roma MAR scheme. It is expected that the WGTF total water consumption will be less than 20 kilolitres per day.

### 2.5.2 Power supply

It is proposed that the WGTF will generate electricity onsite utilising natural gas liquids in gas turbine driven alternators. However power supply to the WGTF may be made available through the provision of bulk electricity supply connection by a third party. Specific details will follow based on Santos GLNG's further investigation into the external power supply. Approval for electrical infrastructure for the Project will be obtained separately by the respective third party supplier.

### 2.5.3 Access to site

Access to the Project site is proposed to be via the existing entrance to WCS from the Wallumbilla South Road, which is a sealed road on the eastern side of the site. This access road is designed for large heavy vehicles (used to construct WCS) and it is envisaged that this will also be used for construction of the Project.

## 2.6 Project life

The Project life is expected to be 25 years. The Project is envisaged to have a construction period of two to two and a half years for the first stage.

# 3. Existing environment, potential impacts and mitigation

## 3.1 Climate

### 3.1.1 Existing environment

The climate of the Project site is classed as sub-tropical with a distinct to moderately dry winter. Based on climate data obtained from the closest Bureau of Meteorology (BOM) weather station at Roma Post Office, the average daily maximum temperatures in the region range from 20°C during winter (July) up to 33°C in summer (January). Annual rainfall in Roma averages 599 mm and more than 60% of the average annual rainfall occurs between November and March. The average annual pan evaporation rate measured at Roma airport is 2,482 mm.

Winds at Roma are generally dominated by north-easterlies during the warmer months of November to March, while prevailing south-westerlies occur during the cooler months of April to October.

### 3.1.2 Potential impacts and mitigation

A number of regional climatic conditions involving bushfires, droughts, floods and severe storms may affect the Project, with the potential for further exacerbation due to climate change. These risks will be more thoroughly assessed during the EIS process with appropriate mitigation measures and controls developed to address them.

## 3.2 Land use and capability

### 3.2.1 Existing environment

#### 3.2.1.1 Land use

The Project site is situated on leasehold land zoned rural for agricultural purposes. The surrounding area is sparsely populated with predominantly large pastoral holdings.

The current land use of the Project site is for petroleum activities associated with the Wallumbilla Hub. The land surrounding the Wallumbilla Hub is used for agricultural activities involving cropping and cattle grazing.

#### 3.2.1.2 GQAL and Strategic cropping land

The Project site is wholly mapped within good quality agricultural land (GQAL) according to the Bendemere Shire Council Planning Scheme 2006, and is considered GQAL Class A: Crop land suitable for current/or potential crops. The Project site is also mapped as being within a Strategic Cropping Management Area within the Western Cropping Zone.

### 3.2.2 Potential impacts and mitigation

As the Project site has existing gas infrastructure operating on it there will not be any change to the existing land use. It is anticipated that impacts to existing activities and surrounding land use as a result of the Project will be minimal.

The SCL trigger areas involve Strategic Cropping Protection Areas and a Strategic Cropping Management Area which are considered land that is under intense and imminent development pressure. The majority of these areas appear to be consistent with Class A GQAL. Detailed land capability and suitability assessments will be undertaken for the EIS to further assess the Project site against the criteria guidelines under the draft State Planning Policy (SPP) "Protecting Queensland's strategic cropping land" for protecting and managing SCL under the *Sustainable Planning Act 2009*. The current draft SPP is not yet in effect but will be part of the EIS assessment.

## 3.3 Geology, soils and geomorphology

### 3.3.1 Existing environment

#### 3.3.1.1 Topography

The topography of the Project site and its surrounds is generally flat and considered suitable for the Project. Risks associated with erosion and sedimentation is low.

#### 3.3.1.2 Geology

Reference to the Digital 1:250,000 Geology Database (Geosciences Australia 2005) mapping indicates that the Project site is underlain by the Wallumbilla formation, which is part of the Wilgunya Subgroup from the Rolling Downs Group. This formation comes from the Middle Jurassic to Early Cretaceous and is formed by clastic sediment characterised by mudstone, siltstone, calcareous shale, sand siltstone, and sandstone with calcareous concretions.

#### 3.3.1.3 Soils

DERM soil and land resource areas mapping indicates the Project is located on soil type Ro4, which is characterised by gently undulating plains with hard alkaline brown dominant soils, commonly associated with similar hard red soils. In many instances the deeper subsoils may be extremely acid. A slight gilgai micro-relief is often present and cracking clays may then occur as soil complexes.

Soils investigations undertaken at the Wallumbilla compressor station confirms that the surrounding area is underlain by loamy duplex soils, cracking clay soils, gilgaied and non-gilgaied (Northcote et. al 1968).

### 3.3.2 Potential impacts and mitigation

Due to the relatively flat terrain and cleared character of the site, the Project will involve only minor vegetation clearing and earthworks for the construction of foundations, pipe works for various components of the gas treatment facilities, as well as internal and external access roads.

The Project will have negligible impact to the topography, geology and soils of the Project site and surrounds. Detailed field investigations will be conducted during the EIS to confirm soil types as well as outline any erosion and sedimentation risks and management requirements for the Project.

## 3.4 Surface water

### 3.4.1 Existing environment

The Project is located south of the Great Dividing Range in the northern part of the Balonne-Condamine catchment of the Murray-Darling Basin. No watercourses pass through the Project site. The nearest watercourses are Wallumbilla Creek and Pickanjinnie Creek (a tributary of the Wallumbilla Creek), which are located approximately 2 km east and 1.7 km west respectively (refer to Figure 2.1).

No detailed flood investigation of the site has been undertaken, however given the location of the Project site in the upper reaches of the catchment, the flat topography and the distance the site is from the closest watercourse the site is not expected to be prone to flooding. Information on the potential for the site to be effected by flooding will be detailed as part of the EIS.

### 3.4.2 Potential impacts and mitigation

The water supply requirements for the Project including the amount and source of supply during the construction and operational phases will be minimal and not be sourced from surface water supplies.

During operations, the potential impacts to surface water associated with the Project are generally limited to accidental spills of contaminants (i.e. hydrocarbons) or the unplanned release of contaminated wastewater (i.e. small quantities of oily water) to the downstream environment. All fuels, chemicals and wastes will be appropriately contained and bunded to prevent loss of containment and potential impact on groundwater and surface water.

An appropriate wastewater treatment system will form part of the Project and will aim to minimise the risk of unplanned releases of contaminated water (both process water and runoff) due to the Project. Sewage is also planned to be treated onsite using a small packaged sewage treatment plant.

A site stormwater management plan will be developed that ensures stormwater runoff from the site is managed in a manner that does not affect existing environmental values.

The EIS will consider the potential surface water impacts in more detail and provide detailed measures to ensure the Project does not affect existing environmental values associated with water. An assessment of potential liquid waste streams from the Project operations will also be undertaken as part of the EIS.

## 3.5 Groundwater

### 3.5.1 Existing environment

The Project site is south of the recharge zones for the Great Artesian Basin (GAB). The major aquifers of the GAB that occur in the region, including the Mooga and Gubberamunda Sandstones, Hutton Sandstone and Precipice Sandstone, may underlay the Project site.

Bores in the local area range between 100 m and 2,500 m deep and are generally completed in the coarser grained units including the Mooga Sandstone which occurs from a depth of approximately 250 m.

Previous groundwater investigations conducted locally suggest that the water table aquifer is within 15 m of ground level but that the lack of bores in the area indicates potentially poor water quality. Shallow groundwater is also likely to be present in close proximity to watercourses (i.e. flowing creeks) and other water bodies (i.e. billabongs), and have been recorded at depths of 10 m in selected areas.

### 3.5.2 Potential impacts and mitigation

No excavations of any depth that would result in groundwater impacts are planned for the Project. No significant groundwater extraction is proposed for the Project. Therefore the potential impacts to groundwater are considered to be inconsequential. Nevertheless the EIS will consider the potential groundwater impacts in more detail and provide detailed measures to ensure the Project does not affect existing environmental values associated with water.

## 3.6 Air quality

### 3.6.1 Existing environment

The existing air quality is characteristic of rural areas, being of a high quality and largely influenced by temporal agricultural activities, i.e. stock movement, harvesting, and ploughing. Existing petroleum operations associated with the Wallumbilla Hub are also likely to be a source of air pollutants, including combustion, venting, vehicles, and generators associated with the Wallumbilla LPG Plant, Wallumbilla Metering Station, two compression stations, and other interconnect facilities. Additionally, minor traffic emissions from nearby roads may also influence the local air quality.

The nearest residence is 450 m east of the Project site, which is a Santos caretaker residence associated with the Wallumbilla LPG Plant. The closest private residence is 1.4 km south of the Project site, with two further private residences 2 and 2.5 km north-west of the Project site, and three other residences between 4 and 5 km from the Project site. Additionally, other than the Santos caretaker residence, 13 buildings comprised of one homestead, two places of principal residence, and ten farm structures are within a 2 km radius of the Project site based on satellite aerial imagery. The township of Wallumbilla is approximately 12.5 km north of the Project.

Figure 3.1 illustrates sensitive receptors within 2 km of the Project.

**Legend**

- Site Boundary (Lot 33 / SP212840)
- Wallumbilla Hub
- 2km Buffer from Hub
- Cadastre

**Sensitive Receptors**

- Homestead
- Principle Place of Residence
- Shed
- Other

**Roads**

- Secondary Road
- Local Road
- Tracks

**Watercourses**

- Major
- Minor

Iona Bardiomey Road

Wallumbilla South Road

PICANINNIE CREEK

WALLUMBILLA CREEK



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| **Date:** 12/12/2011 | |
| **Author:** RS | |
| **Checked:** BJ | |
| **Revision:** A1 | Imagery, Cadastre, Recptors curtsey of Santos, 2011.<br>Roads © The State of Queensland (Department of Environment and Resource Management) 2011.<br>GEODATA Topographic 250K Series 3, © Commonwealth of Australia (Geoscience Australia) 2006. |

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# Wallumbilla Gas Treatment Facility IAS

Figure 3.1
Sensitive Receptors

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### 3.6.2 Potential impacts and mitigation

Construction emissions are expected to be generated from construction vehicles, machinery exhausts as well as dust from exposed soils. Combustion engine emissions will be managed appropriately through the correct maintenance and operation of machinery and vehicles and the reduction of engine idle times.

Due to the separation distance between the Project site and sensitive receptors, and the relatively short period required for construction, it is anticipated that these air quality impacts during the Project's construction phase will be minimal.

During operation, the proposed gas treatment facility may produce planned and unplanned fugitive CSG emissions as well as the following combustion emissions associated with compressor engines, generators, and vehicles:

- carbon dioxide ($CO_2$)
- carbon monoxide (CO)
- nitrogen oxides (NOx)
- sulphur dioxide ($SO_2$)
- volatile organic compounds (VOCs)
- particulates and dust.

NOx and $CO_2$ are anticipated to be the main air pollutants to be emitted at the facility. Air quality impacts associated with the construction and operation of the Project will be addressed in more detail in the EIS.

Greenhouse gas emissions will be addressed separately in the EIS with an assessment in accordance with the National Greenhouse and Energy Reporting Technical Guidelines, outlining the likely amount of greenhouse gas emissions from the Project and a brief description of the abatement measures to minimise the Project's carbon footprint. The management of greenhouse gas emissions will be based around Santos' existing greenhouse gas management system, which is implemented as part of its Environment, Health and Safety Management System (EHSMS).Santos GLNG has committed to the following actions for the Project:

- a requirement that all operations develop energy efficiency and greenhouse management plans with site-specific targets
- identification and promotion of opportunities for natural gas to replace higher greenhouse emitting fuels
- investment in energy and process research and development, and to work cooperatively with other parties
- participation in external voluntary greenhouse reduction programs.

The specific documents that outline these commitments include the Santos Greenhouse Policy, Greenhouse Hazard Standard and Energy Efficiency Hazard Standard.

## 3.7 Noise and vibration

### 3.7.1 Existing environment

Despite the existing background noise being typical of rural areas, the Project is proposed to be located adjacent to a hub of industrial development of gas handling facilities that are likely to influence the existing noise character of the surrounding area. Additionally, local traffic from nearby rural roads and agricultural activities from surrounding properties also will contribute to background noise levels.

Within a search area of 2km, the closest private residence is 1.4 km south of the Project site, with two further private residences 2 and 2.5 km north-west of the Project site and three other residences between four and five kilometres from the Project site. There are three sensitive receptors within 1.5 km of the Project site with the nearest being the Santos LPG plant caretaker residence approximately 450 m east of the Project site (refer to Figure 3.1).

### 3.7.2 Potential impacts and mitigation

Construction noise will be characterised by machinery noise from site preparation activities such as land clearing and earthworks, facility construction and transportation of materials and equipment associated with these activities. These are anticipated to be of relatively short duration and intensity and result in a temporary increase in ambient noise levels within the immediate vicinity of the construction site.

Operational noise will be mainly restricted to the gas processing activities at the site. The facility will be designed, constructed and operated in a manner to minimise noise impacts to the surroundings at all times. The EIS will address the noise impacts associated with the WGTF Project during construction and operation and provide any noise mitigation strategies or management controls where appropriate to ensure that noise does not exceed acceptable levels.

## 3.8 Terrestrial ecology

### 3.8.1 Existing environment

The Project site and its surrounds are situated to the south of the Brigalow Belt Bioregion and is largely part of native grassland communities in the Brigalow Belt South Bioregion. The local area has been significantly disturbed by past land clearing and agricultural activities. Much of the groundcover of the site and its immediate surrounds has already been removed as part of existing petroleum activities.

No environmentally sensitive areas are located within or near the Project site. No remnant or non-remnant vegetation is mapped in or adjacent the Project. The closest protected area is the Wallabella and Yuleba State Forests, which are approximately 9 km south and 15 km southeast of the Project site, respectively.

The closest area of mapped remnant vegetation is in the vicinity of Pickanjinnie Creek approximately 1.2 km west of the Project site.

The site does not contain any aquatic or riparian environments. Initial investigations indicate that no EPBC Act Protected Matters are located within the Project site. Refer to Appendix A for the preliminary assessment of EPBC matters.

### 3.8.2 Potential impacts and mitigation

All existing vegetation will be required to be cleared from the site for the construction of the Project. As the site contains no significant vegetation, it is considered that the site does not contain habitat suitable for threatened species to be present.

A detailed ecological investigation will be conducted as part of the EIS that will further assess the potential impacts due to the Project on the existing biological values, and where required formulate appropriate mitigation and management measures.

## 3.9 Visual amenity

### 3.9.1 Existing environment

The Project is proposed to be constructed on relatively flat to undulating open terrain adjacent to a hub of industrial development of gas handling facilities surrounded by a rural area mainly comprised of agricultural land characterised by a low density population.

### 3.9.2 Potential impacts and mitigation

As the Project will be located adjacent to existing petroleum facilities, it will not be an entirely new visual element in the area, although the scale of the plant will be significantly larger than the existing facilities. The surrounding area is considered to have a low visual sensitivity, due to the small viewing population and existing petroleum activities.

However, the Project will be visually noticeable from local roads and some landholder residences. Overall, the Project is expected to cause low to moderate visual change to the landscape given the existing land use and low visual sensitivity of the area.

The extent of visual impacts (including lighting impacts) will be further assessed in the EIS and appropriate mitigation measures developed as required.

## 3.10 Cultural heritage

### 3.10.1 Existing environment

The Project is located on land subject to an active native title claim by the Mandandanji People (Native Title claim QUD 6157/98). No cultural heritage inspections have yet been conducted for the Project site. However a cultural heritage inspection was undertaken for the adjacent Wallumbilla Compressor Station, which found no significant cultural heritage sites.

### 3.10.2 Potential impacts and mitigation

Santos has developed a Cultural Heritage Management Plan (CHMP) with the Mandandanji People under the *Aboriginal Cultural Heritage Act 2003* (Qld). This CHMP was approved by the chief

executive of DERM 2009 and provides for an agreed process for the management of Aboriginal cultural heritage within the area of the Mandandanji claim, which includes the area of the Project.

## 3.11 Socio-economics

### 3.11.1 Existing environment

The Project is located in a low population density rural zoned area within the jurisdiction of the Maranoa Regional Council. Dominant land uses in the region include agriculture, pastoral (livestock) activities, and cereal cropping. Employment in the region is largely dominated by the agricultural and forestry sectors, with public administration, transport, education and health sectors also contributing significantly. The region is predicted to experience rapid growth and diversification of industry into the energy resources sector primarily as a result of its location within the Surat Basin's extensive gas and mineral reserves.

The closest town is Wallumbilla, which is approximately 12 km north of the Project site. It has a population of about 300 people and a predominantly rural based economy reliant on the established agricultural industry surrounding the area.

Major population centres nearby include Roma and Miles townships. Roma is approximately 50 km west north-west of the Project and has a community of approximately 7,000 people, which makes it a major service centre for the western region of the Darling Downs. It is a hub of an established sheep and cattle grazing industry, however the growth of the energy sector is expected to contribute to significant economic growth in the Maranoa and Western Downs regions.

### 3.11.2 Potential impacts and mitigation

The socio-economic impact associated with the Project upon the community and the local economy is anticipated to primarily relate to the construction phase which will result in a significant increase in the level of activity in the local area. This activity will be associated with the transportation of people and equipment to the Project site, with an increase in heavy vehicle movements on the local and regional road network.

A workforce of 250-350 personnel is expected to be required for the construction phase of the Project, with an accommodation camp for the workforce proposed to be established close to the Project site. The accommodation camp is likely to be relocated from another Santos GLNG construction site in the region, and will be established to meet local government requirements.

A permanent workforce of up to twenty personnel will be required for the operation and maintenance of the facility.

The cumulative effect of a large number of resource and energy developments in the region and the associated increase in temporary and permanent population has the potential to place increased load on the region's social services and social infrastructure.

There is potential for the Project to provide benefits to the local and regional community through the creation of new direct employment opportunities and through indirect employment with Project contractors and supply chain partners.

Santos GLNG will be actively identifying opportunities for the local economy and engaging with local landholders and stakeholders to ensure they fully understand the Project. Further specific details on

workforce numbers and arrangements will be considered as part of the EIS, along with a detailed socio-economic assessment of the likely Project impacts to identify strategies and measures for mitigation and opportunities.

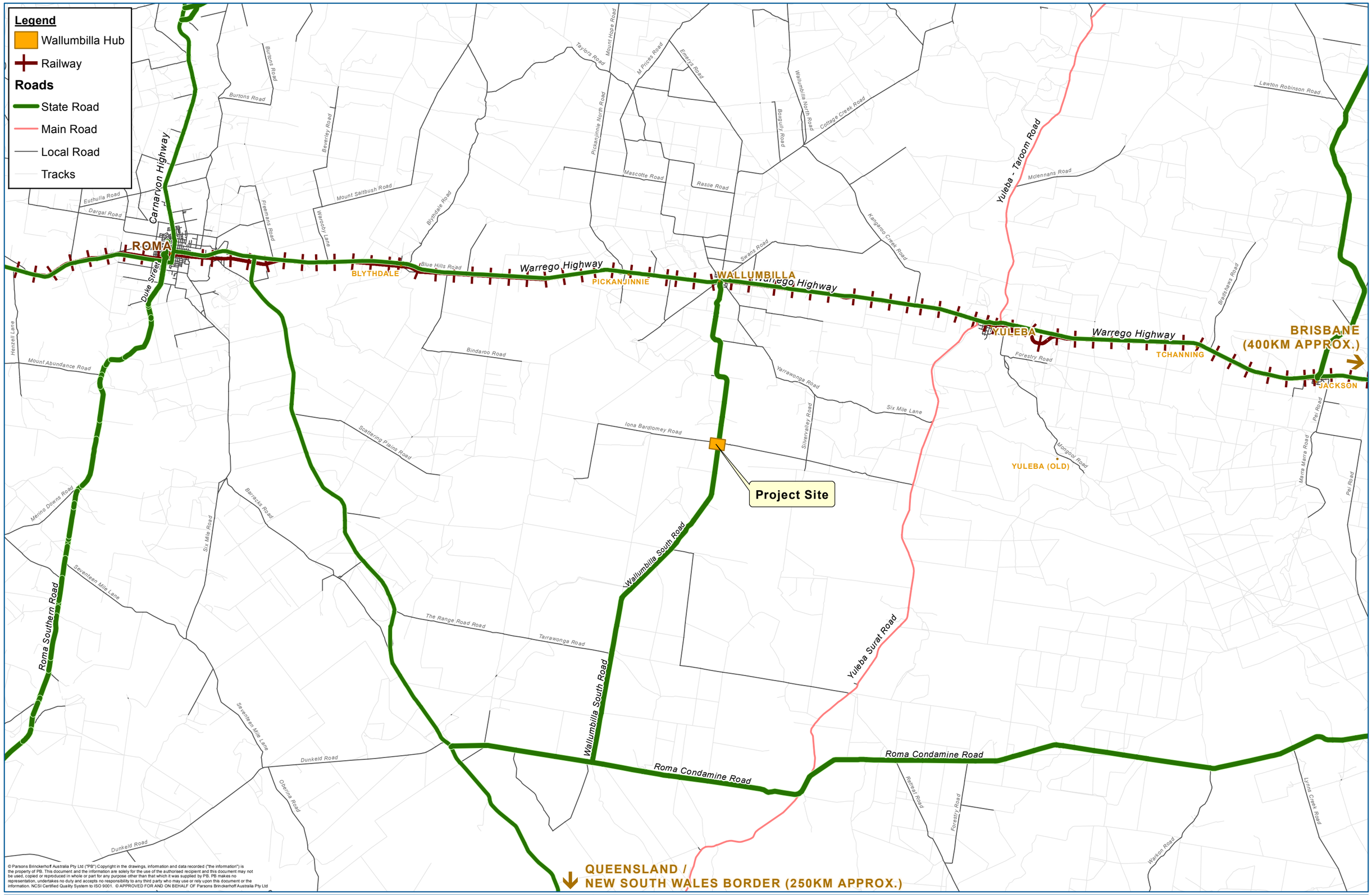
## 3.12 Transport and infrastructure

### 3.12.1 Existing environment

The Project site is accessed via Wallumbilla South Road and Iona Bardlomey Road from the Warrego Highway, which is located approximately 12 km north of the site. Wallumbilla South Road and the Warrego Highway are State Controlled Roads.

Figure 3.2 illustrates road and railway network surrounding the Project site.

A network of underground petroleum pipelines identified in Section 2.3, and the operational WMS and WCS are situated within and adjacent to the Project site. The petroleum infrastructure forms part of the Wallumbilla Hub.

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| **Date:** 12/12/2011 | |
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| **Checked:** BJ | |
| **Revision:** A1 | Imagery, Cadastre, Receptors curtsey of Santos, 2011.<br>Roads and Rail © The State of Queensland (Department of Environment and Resource Management) 2011. |

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**Wallumbilla Gas Treatment Facility IAS**

Figure 3.2
Roads and Railway Network

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### 3.12.2 Potential impacts and mitigation

Access to the site is proposed via the existing entrance to WCS on the Wallumbilla South Road, which is on the eastern side of the site. This road is designed for large heavy vehicles suitable for the construction of the Project.

Alternate access of heavy vehicles from Iona Bardlomey Road on the north boundary of the site is restricted due to the number of underground services along the corridor, which are the existing CRWP, SWQP, the new SWQP loop (currently being installed) and telecom services adjacent to the Project site.

Separate access to the proposed Switchyard will be required and an easement has been proposed from Iona Bardlomey Road. Power supply to the Project is currently under further investigation though it is envisaged that a bulk electricity supply will be facilitated via connection to the existing network. The provision of water supply to the Project site is still yet to be determined but will be finalised during the EIS process.

There will be traffic impacts associated with the transport and delivery of plant equipment, building materials and other supplies via the local network, as well as the transportation of the construction workforce to the Project site. The Warrego Highway will serve as the principal transport route and can be accessed via the Wallumbilla South Road. These roads would be already used by local traffic to access the existing natural gas facilities adjacent to the Project.

The Project is likely to increase traffic loads on the local road network, particularly during construction phase. Santos GLNG will actively manage road safety and traffic hazards that arise from the Project construction and operation.

The cumulative effect on the regional and local road network from other resource and energy developments occurring is likely to result in an incremental increase of number of traffic movements and associated load and wear on the transport network.

The number of transport movements is still yet to be determined but will addressed in the EIS, as well as a detailed review of existing transport and other infrastructure, potential impacts to these (e.g. potential damage to existing road surfaces), and provision of mitigations to minimise the anticipated impacts.

## 3.13 Waste streams

### 3.13.1 Waste generation

The Project will generate a number of waste streams and by-product streams in addition to the main natural gas stream being produced to feed the GLNG facility via the Gladstone Gas Transmission Pipeline. The by-product streams (including natural gas liquids (NGL) and C5+ liquids should not be considered waste streams (as defined in the Queensland *Environmental Protection Act* 1994 (EP Act)) since they typically have both energy and economic values either as marketable commodities or as an alternative source of energy for the WGTF itself. This will be demonstrated in the EIS. In particular, the light NGL, including ethane and the principal components of LPG such as propane and butane, will be used as fuel for gas turbine generators to provide power for the facility. The C5+ liquids can be used as a gasoline blend or crude oil blend stock.

Waste streams produced by the Project will include:

- pigging waste (produced from intermittent pipeline cleaning operations)
- spent absorbents (removed infrequently from molecular sieve dehydration units and mercury guard beds during maintenance)
- oily water (produced continually from the process or runoff from any oily surfaces)
- used lubricants (removed from rotating machinery during routine maintenance)
- miscellaneous maintenance waste (paints, solvents, scrap metal, rags, packaging etc.)
- domestic and other waste (putrescibles, office waste etc.).

Most of these wastes will be generated either intermittently or in relatively small quantities. Recycling principles will be applied where possible for materials such as scrap metal and used lubricants and solvents. On-site treatment will be provided for oily water. Other wastes will be managed by providing appropriate storage facilities and identifying approved waste disposal methods. In particular, pigging waste and absorbent materials may include contaminants that will could make them regulated wastes and require careful selection and control of treatment and disposal methods in accordance with the Environmental Protection (Waste Management) Regulation 2000 (Qld), and the Waste Reduction and Recycling Act (2011 (Qld).

### 3.13.2 Storage of materials

All waste materials will be stored in appropriate containers and in suitable, secure locations to ensure that the waste is kept segregated, is protected from contamination by other wastes, is kept under control to prevent contamination of the site or any surface waters, and does not pose any health or safety risk to personnel or the public. In particular, waste that is suitable for reuse or recycling will be segregated to ensure that it retains the maximum recycling potential and value with minimum recovery effort in accordance with the waste and resource management hierarchy.

## 3.14 Risk assessment

Operation of the WGTF involves storing and processing a range of dangerous goods, including natural gas, light natural gas liquids (NGL) and heavier C5+ liquids. In addition, sections of the Project involve high pressures and both high and low temperatures. Incidents such as mechanical failure, mechanical damage or corrosion leading to a loss of containment of any of these materials could result in a pool or jet fire, a flash fire or vapour cloud explosion, or (in the event of a vessel containing for example NGL being involved in a fire) a boiling liquid expanding vapour explosion (BLEVE). Although it is expected that the frequency of such events would be very low, were they to occur the outcomes would pose a risk to facility personnel, and in more serious cases impacts could extend beyond the site boundary and might pose a risk to members of the public.

The quantities of dangerous goods that will be stored or handled at the Project site are expected to result in the proposed gas treatment facility being classed as a Large Dangerous Goods Location, or possibly as a Major Hazard Facility, under the Dangerous Goods Safety Management Act 2001 (Qld) and Dangerous Goods Safety Management Regulation 2001 (Qld) . Under this legislation there are strict requirements for the assessment of risks associated with the facility, the design principles used,

emergency procedures, fire protection systems and the provision of information to potentially affected people.

A risk assessment will be conducted as part of the EIS to identify, analyse and evaluate the risks associated with both constructing and operating the Project. The risk assessment will consider both individual and societal risks and evaluate them against the generally accepted planning guidelines for hazardous industry. This evaluation will include identification of the at-risk population that might be exposed in the event of an incident. The risk assessment will include development of appropriate controls and strategies to minimise risks that are identified as unacceptably high during the assessment. The level of detail that can be achieved for this risk assessment will be dictated by how advanced the design is at the time.

A preliminary hazard assessment will be used to determine the level of detail required based on the estimated risk. However, risk assessments and other studies such as hazard and operability studies (HAZOPs) and fire risk studies, complying fully with the requirements of the Dangerous Goods Safety Management Act and Regulations, and with any requirements of development approvals for the Project, will be completed and their recommendations will be implemented, before operations commence.

To minimise the risk to facility personnel and the public, the design and operation of the Project will include compliance with all relevant Australian and international standards and codes and with all applicable legislation.

# 4. Community and stakeholder consultation

## 4.1 Approach to community engagement

Santos GLNG's vision is to be a valued and valuable member of the communities in which it operates and to be recognised as a company that conducts activities in a manner that sustains and enhances its social licence to operate.

To achieve its social licence to operate, Santos GLNG embeds the following four key principles into its approach to the community (refer to Figure 4.1).


Figure 4.1 Social license to operate key principles

## 4.2 Community consultation

Communities impacted by the Project will be consulted and engaged through a variety of mechanisms.

### 4.2.1 1800 761 113 free-call service

Santos GLNG will provide a free-call service which is staffed during business hours by community engagement officers. All enquiries are registered and responded to within 48 hours.

### 4.2.2 Website

www.glng.com.au and www.santos.com. These websites will provide quick access to information about the Project. There will be links to the latest facts sheets and an email address to request further information about the Project.

### 4.2.3 Community newsletters and fact sheets

Santos GLNG will produce a community newsletter to inform the community of progress on the Project. Newsletters are distributed through local newspapers, direct mail or email. A range of fact sheets covering key topics of interest will also be made available.

### 4.2.4 Community shopfronts

Santos GLNG has a regional community shopfront located at 80 McDowall St, Roma that is open five days a week during business hours for community access.

### 4.2.5 Targeted stakeholder briefings

Santos GLNG will provide tailored project briefings targeting the key issues raised by key stakeholders.

### 4.2.6 Community information sessions

Santos GLNG will hold regular public information sessions in the communities affected by the Project.

### 4.2.7 Issue specific workshops

Santos GLNG is committed to working in collaboration with its industry colleagues, local and state governments, peak bodies and special interest groups and the general community.

### 4.2.8 Site tours

Santos GLNG regularly conducts site tours for special interest groups and members of the community. Site tours aim to not only inform the participants of Santos GLNG and GLNG Operations Pty Ltd activities but to also show transparency of the operations.

## 4.3 Community Engagement Objectives

The objectives of the Community Engagement programs are to:

a) identify key stakeholders and opinion leaders

b) communicate information about the key aspects of the proposed Project

c) provide feedback pathways for the community to raise issues or concerns, or identify opportunities for the community to benefit from the Project

d) establish and build trust within the communities that will be impacted by the Project.

## 4.4 Key Stakeholder Groups

The key stakeholder groups that will be approached for consultation on the Project include:

- landholders
- Aboriginal groups

- general community
- local and State Government agencies
- social service groups
- peak body associations
- special interest groups
- members of Parliament.

# 5. Project environmental, health and safety and social management

## 5.1 Introduction

Santos GLNG is committed to minimising the environmental risks of the Project through a comprehensive and rigorous planning, assessment and management process. This will include thorough consideration of environmental issues and adoption of appropriate controls in the design, planning approval, construction and operational stages of the Project in accordance with the Santos Environmental Health and Safety Management (EHSM) system requirements.

## 5.2 Santos GLNG's Environmental, health and safety management system

Santos has developed an EHSM system that applies to all Santos operations in Australia. Santos GLNG utilises this system.

The framework has been developed to ensure compliance with Australian Standard 4801:2001 Occupational Health and Safety Management Systems – Specification with guidance for use, and AS/NZS ISO 14001:2004 Environmental Management Systems – Specification with guidance for use.

## 5.3 Santos GLNG's greenhouse policy

Santos GLNG recognises one of its key environmental responsibilities is to pursue effective strategies that address the issue of greenhouse gas emissions. As a global stakeholder in the energy business, Santos GLNG believes it has a responsibility to constantly strive for improvements in its business, overall contribution to greenhouse gas emission reductions and energy efficiency.

## 5.4 Project environmental management

Santos GLNG is committed to undertaking activities associated with the Project in an environmentally responsible manner, and intends to implement best practice environmental management as part of a program of continuous improvement. This will be achieved by addressing issues systematically, consistent with accepted standards and the Santos EHSM system.

An important element of this systematic approach will be the development of detailed environmental assessment and management procedures to guide construction, commissioning, operation and emergency response activities.

Project environmental management will apply throughout the life of the Project from design through to planning approval, construction, and operational stages.

### 5.4.1 Construction stage

The construction phase of the Project involve site clearing, earth and civil works, erection of steel work, installation of machinery and equipment and the integration of management and process systems. During the Project construction phase, measures will be undertaken to ensure that all environmental

risks are minimised. All construction materials and practices will be in accordance with relevant Australian and/or international standards.

The Project construction manager will be responsible to oversee the development and implementation of a construction phase environmental management plan to achieve the above objectives.

### 5.4.2 Operational stage

During the operational phase, aspects of the Project will be undertaken on a continuous 24 hours per day/365 day per year basis with periodic scheduled shutdowns for routine preventative maintenance. The design approach will incorporate the need to minimise inventories of materials and the minimum use of chemicals and reagents with a high environmental impact. The Project components will also be designed to minimise the generation of solid, liquid and gaseous wastes.

### 5.4.3 Decommissioning

The planning of decommissioning the Project is yet to be determined at this early stage of the Project development. However, decommissioning will be undertaken in accordance with accepted industry practices, stakeholder and regulatory requirements.

## 5.5 Community/social management

Santos GLNG is committed to open and accountable processes that encourage stakeholder engagement throughout all stages of the Project. As such, Santos GLNG will develop and prepare an extensive and ongoing Stakeholder Engagement Plan. The broad ranges of stakeholders that will be consulted include a diverse cross-section of government, industry and community representatives.

## 5.6 Health and safety issues management

Public and workforce health and safety during both construction and operations are paramount to Santos GLNG. Drawing from expert personnel and the Santos EHSM system, the potential health and safety hazards and risks will be identified and assessed, then will be the subject of substantial planning, organisation and procedural/facility development.

The Project will be designed to include spill containment systems, fire protection systems, multiple gas, flame, smoke and low- and high- temperature detectors and alarms, and automatic and manual shutdown systems. The efficiency and stability of operations will be maximised by the use of a high level of automation, regular preventative maintenance, and safeguards such as backup systems and the capability for safe emergency shutdowns.

Prior to Project commissioning, all personnel will be required to pass an extensive training program to ensure safe operating practices. The training program and subsequent regular refresher programs will involve issues covering operations, hazards, safety and emergency procedures and environmental management.

## 5.7 Monitoring

Santos GLNG proposes to establish a comprehensive environmental monitoring program to measure and record Project specific environmental performance. The program will place emphasis on

performance indicators involving the release of contaminants, discharges and iincidents. This will be to confirm that discharges and emissions comply with all relevant environmental licence and approval conditions.

Regular environmental audits will be undertaken by the proponent. These audits will help Santos GLNG management assess the efficiency and effectiveness of the Project's operation from an environmental, safety and community perspective and to take appropriate corrective action as necessary.

# 6. Costs and benefits summary

The Project will result in a range of local and regional economic benefits, and is also likely to result in localised environmental impacts. This section briefly outlines those expected costs and benefits.

## 6.1 Economic costs and benefits

Santos GLNG has committed to a significant economic investment in the State. The Project is expected to have significant local and regional economic benefits through the demand it will create for a wide range of goods and services associated with the construction and operation of the WGTF. It will also provide up to twenty permanent employment opportunities in the local area. As a significant infrastructure addition to the State's gas network the Project will provide economic benefit through enhanced access to markets.

## 6.2 Environmental costs and benefits

The Project is expected to have minimal impact on surrounding environmental values due to the nature of the Project, the location of the Project site as part of the Wallumbilla Hub, and the characteristics of the Project site being previously largely cleared, flat and not within close proximity to any environmentally significant areas. Localised noise and visual impact will result from the Project.

As an operational facility the Project is expected to consume energy however its contribution to the CSG and LNG industry demonstrates an overarching positive environmental benefit in influencing the progression of a cleaner energy fuel which has the potential to decrease carbon emissions both nationally and internationally through lower dependency on more carbon intensive fuel sources.

## 6.3 Social costs and benefits

Considering the nature of the Project, negative social impacts are expected to be negligible or temporary with the main effects most likely to be related to aspects of the construction phase such as an increase in road traffic.

The Project is likely to benefit local communities through stimulation of economic activity at a local scale through the integration of Project workers during both the construction and operational phases. The Project may also provide employment opportunities for locals.

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# Appendix A

## EPBC Supporting Information

**Parsons Brinckerhoff Australia Pty Limited**

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A+ GRI Rating: Sustainability Report 2010

# Memo

**Date** 10 January 2012

**To**

**From**

**Ref** 2117262a-MEM003-A-bm

**Subject** Wallumbilla Gas Treatment Plant - EPBC Supporting info

## 1. Background

Parsons Brinckerhoff Group Inc. (Parsons Brinckerhoff) has been engaged by Santos GLNG to prepare the Environmental Impact Statement and potential Commonwealth approvals, and all associated studies for the Wallumbilla Gas Treatment Facility (the Project).

The purposes of this memo is to advise Santos GLNG in relation to whether the Project is required to be referred to the Commonwealth Minister for a decision on whether approval is required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The EPBC Act requires that if a Project will impact or potentially impact a matter of national environmental significance (NES), referral of the Project to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) may be triggered. The matters of NES include:

- listed threatened species and communities
- listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine environment
- world heritage properties
- national heritage places
- the Great Barrier Reef Marine Park
- nuclear actions
- impacts involving the Commonwealth or Commonwealth land.

A search of the EPBC Act Protected Matters Search Tool and Wildlife Online database was undertaken on 16 November 2011 and 8 December 2011, respectively. Details are provided in the Preliminary assessment of Commonwealth Matters of NES section below and a copy of the report is included in Attachment 1.

In order to establish whether the Project has potential to significantly impact matters of NES, a desktop review of flora and fauna values relevant to the project has been undertaken using aerial photography, database information and Queensland vegetation mapping.

## 2. Preliminary assessment of Commonwealth Matters of NES

The EPBC Act Protected Matters database search returned the following results.

**Table 1: Summary of EPBC Matters of NES**

| EPBC matters of NES | |
|---|---|
| World Heritage Properties | None |
| National Heritage Places | None |
| Wetlands of International Significance (RAMSAR) | Narran Lake Nature Reserve |
| Great Barrier Reef Marine Park | None |
| Commonwealth Marine Areas | None |
| Threatened Ecological Communities | 2 |
| Threatened Species | 11 |
| Migratory Species | 8 |

Searches of the EPBC Act Protected Matters Search Tool (SEWPaC 2011a) and Wildlife Online database (DERM 2011) were undertaken to establish known or potential records of Commonwealth listed Threatened species or ecological communities (i.e. NES) within or adjacent to (within a 5km buffer) the Project site. Search results indicate one bird, one fish, three mammals and three reptiles listed as Endangered or Vulnerable under the EPBC Act as potentially occurring within the search area. In addition, results include one vulnerable reptile, the Brigalow Scaly-foot (*Paradelma orientalis*) as known to occur in the search area and two bird species, the Vulnerable Squatter Pigeon (*Geophaps scripta scripta*) and Endangered Star Finch (eastern) (*Neochmia ruficauda ruficauda*) as likely to occur in the search area. Table 2 below presents an assessment of the likelihood of EPBC Act listed threatened species identified in the protected matters search to occur in the Project site.

The search results also identify eight species (comprising seven bird species in addition to those listed as Threatened) listed under the Migratory and/or Marine provisions of the EPBC Act. Of these species, the White-bellied Sea-eagle (*Haliaeetus leucogaster*) is considered likely to occur in the search area. Additionally, five invasive animals and three invasive plants were returned from search results as potentially occurring within the search area.

Version 6.1 of the Queensland remnant regional ecosystem (RE) mapping and Version 2.1 of the regrowth RE mapping indicates that no remnant or high value regrowth REs occur within or immediately adjacent the Project site. Review of aerial photography confirms that the majority of vegetation on the site has been cleared for past and current agricultural use, with the exception of two small stands of trees in the west and south of the Project site. Pickanjinnie Creek, which occurs approximately 1.2 km to the west of the Project site is mapped as supporting Of Concern REs 12.3.25 and 12.3.2. Weeping Myall Woodlands are listed as an Endangered ecological community under the EPBC Act and typically occur as small patches in two REs in Queensland, one of which is RE 12.3.2.

The EPBC Act Protected Matters Report also identifies this Threatened Ecological Community (TEC) as likely to occur within the search area as well as one other TECs as potentially occurring in the search area; Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions.

In the absence of field survey data at this early stage of the Project, four matters of NES have been identified as potentially triggering referral of the Project to the SEWPaC under the EPBC Act:

- The Vulnerable Brigalow Scaly-foot is known to occur in the local area as this species was returned from both the EPBC Act Protected Matters Search and the Wildlife On-line database search.
- The Endangered Star Finch is considered likely to occur within the search, based on predictive modelling of the EPBC Act Protected Matters Search Tool.
- The Vulnerable Squatter Pigeon is considered likely to occur within the search area, based on predictive modelling of the EPBC Act Protected Matters Search Tool.
- The Migratory White-bellied Sea-eagle is considered likely to occur within the search area, based on predictive modelling of the EPBC Act Protected Matters Search Tool.

The Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (SEWPaC 2001b) outline the circumstances in which it is recommended that a Project be referred under the EPBC Act. In regard to this Project, the Project site would occur within the modelled distribution of the Brigalow Scaly-foot, however, the suitability of habitat on or immediately adjacent the Project site would need field assessment. Similarly, field assessment of the Project site is necessary to determine habitat suitability for each of the other matters of NES listed above.

**Table 2 EPBC Act listed threatened species returned from the protected matters search area**

| Species | Common Name | EPBC Act status | Preferred habitat | Likelihood of occurring in the Project area |
|---|---|---|---|---|
| *Geophaps scripta scripta* | Squatter Pigeon (southern) | Vulnerable | The Squatter Pigeon (southern) occurs mainly in grassy woodlands and open forests that are dominated by eucalypts. It has also been recorded in sown grasslands with scattered remnant trees, disturbed habitats (i.e. around stockyards, along roads and railways, and around settlements), in scrub and acacia growth, and remains common in heavily-grazed country north of the Tropic of Capricorn. The species is commonly observed in habitats that are located close to bodies of water (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |
| *Neochmia ruficauda ruficauda* | Star Finch (eastern), Star Finch (southern) | Endangered | The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |
| *Rostratula australis* | Australian Painted Snipe | Vulnerable | Inhabits shallow, vegetated, temporary or infrequently filled wetlands, including where there are trees such as *Eucalyptus camaldulensis* (River Red Gum), *E. populnea* (Poplar Box) or shrubs such as *Muehlenbeckia florulenta* (Lignum) or *Sarcocornia quinqueflora* (Samphire). Feeds at the water's edge and on mudflats on seeds and invertebrates, including insects, worms, molluscs and crustaceans. Males incubate eggs in a shallow scrape nest (Garnett & Crowley 2000). | Low – lack of suitable habitat |
| *Maccullochella peelii peelii* | Murray Cod, Cod, Goodoo | Vulnerable | The Murray Cod has the ability to live in a diverse range of habitats, including clear rocky streams (such as those found in the upper western slopes of NSW), to slow flowing, turbid rivers and billabongs. Within the large range of habitats, the Murray Cod is usually found near complex structural cover such as large rocks, snags, overhanging vegetation and other woody structures. The Murray Cod is considered a main channel specialist as it is frequently found in the main river channel and larger tributaries. It is found in floodplain channels when they contain water; although this usage appears limited. Juveniles are most commonly found in the main river channel until about one year of age, after which they branch out (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |

| | | | | |
|---|---|---|---|---|
| *Chalinolobus dwyeri* | Large-eared Pied Bat, Large Pied Bat | Vulnerable | Occurs in moderately wooded habitats, mainly in areas with extensive cliffs and caves and roosts in caves, mine tunnels and the abandoned, bottle-shaped mud nests of Fairy Martins (Churchill 1998). Breeding habitat (maternity roosts) is located in roof domes in sandstone caves. Thought to forage below the forest canopy for small flying insects (Churchill 1998). | Low – lack of suitable habitat |
| *Dasyurus hallucatus* | Northern Quoll | Endangered | The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern Quoll is also known to occupy non rocky lowland habitats such as beach scrub communities in central Queensland. Northern Quoll habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Rocky habitats are usually of high relief, often rugged and dissected but can also include tor fields or caves in low lying areas such as in Western Australia. Eucalypt forest or woodland habitats usually have a high structural diversity containing large diameter trees, termite mounds or hollow logs for denning purposes. Dens are made in rock crevices, tree holes or occasionally termite mounds. Northern Quolls sometimes occur around human dwellings and campgrounds. Northern Quolls appear to be most abundant in habitats within 150 km of the coast (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |
| *Nyctophilus timoriensis* (South-eastern form) | Greater Long-eared Bat, South-eastern Long-eared Bat | Vulnerable | The species has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia. It occurs in far eastern South Australia, in areas north of the Murray River {Turbill, 2008 #3634}. It occurs in a range of inland woodland vegetation types being most abundant in vegetation with a distinct canopy and a dense cluttered shrub layer {Dominelli, 2000 #3635}(Ellis et al. 1999){Lumsden, 1994 #3636}{Parnaby, 1995 #3637}{Turbill, 2006 #3633}. Roosting and breeding habitat includes in tree hollows and under loose bark in arid and semi-arid Australia (Strahan 1995) and forages in the understorey of woodlands and open savannah and swamps (Churchill 1998). | Low – lack of suitable habitat |
| *Delma torquata* | Collared Delma | Vulnerable | The Collared Delma normally inhabits eucalypt-dominated woodlands and open-forests in Queensland Regional Ecosystem Land Zones (LZ):<br>- LZ 3 - Alluvium (river and creek flats)<br>- LZ 9 - Undulating country on fine-grained sedimentary rocks<br>- LZ 10 - Sandstone ranges (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |

| | | | | |
|---|---|---|---|---|
| *Egernia rugosa* | Yakka Skink | Vulnerable | The Yakka Skink is known to occur in open dry sclerophyll forest, woodland and scrub. The core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions. It occurs in a wide variety of vegetation types within Queensland Regional Ecosystem Land Zones (LZ):<br>- LZ 3 - Alluvium (river and creek flats)<br>- LZ 4 - Clay plains not associated with current alluvium<br>- LZ 5 - Old loamy and sandy plains<br>- LZ 7 - Ironstone jump-ups<br>- LZ 9 - Undulating country on fine-grained sedimentary rocks<br>- LZ 10 - Sandstone ranges (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |
| *Furina dunmalli* | Dunmall's Snake | Vulnerable | Occurs in south-east interior of Queensland, including the Darling Downs, and is thought to potentially extend into inland north-eastern NSW. Most locality records are between 200 and 500 m elevation. Preferred habitat is Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. Also occurs in eucalypt and Callitris woodland with fallen timber and ground litter. | Low – lack of suitable habitat |
| *Paradelma orientalis* | Brigalow Scaly-foot | Vulnerable | The Brigalow Scaly-foot's core habitat occurs mostly within the Brigalow Belt South bioregion. The species is found in a wide variety of remnant and non-remnant open forest to woodland habitats. The species is known to persist in highly disturbed vegetation types, for example those areas invaded by Buffel Grass (*Cenchrus ciliaris*), Parthenium (*Parthenium hysterophorus*) and other weeds. The species occurs within the following Queensland Regional Ecosystem Land Zones (LZ):<br>- LZ 3 - Alluvium (river and creek flats)<br>- LZ 4 - Clay plains not associated with current alluvium<br>- LZ 5 - Old loamy and sandy plains<br>- LZ 7 - Ironstone jump-ups<br>- LZ 8 - Basalt plains and hills (only where close to the interface with LZ 10)<br>- LZ 9 - Undulating country on fine-grained sedimentary rocks<br>- LZ 10 - Sandstone ranges (Department of Sustainability Environment Water Population and Communities 2011). | Low – lack of suitable habitat |

## 3. Conclusions

It is noted that the Project site and surrounding areas have been cleared of the majority of vegetation for past and current agricultural use. The Project site is highly modified from development of gas facilities, which would typically reduce habitat suitability for most Threatened animal species. Furthermore, there are no other matters of NES (including remnant or high value regrowth vegetation that may contain TECs) known to occur immediately adjacent or downstream i.e. within 1 km of the Project site, that would trigger referral of the Project. Considering this, it would be unlikely that the Project site provides important habitat for matters of NES and therefore very unlikely that the Project would result in a significant impact to a matter of NES.

The full extent of ecological impacts will be assessed as part of detailed field investigations to be undertaken as part of the preparation of an EIS. Verified field information will enable confirmation of this assessment of the matters of NES that are relevant to the Project and allow a full assessment of the significance of impacts to each of those matters of NES to be undertaken.

As the preliminary assessment undertaken above indicates, at this stage it is considered that there are no matters of NES impacted by the Project, therefore it is concluded that the Project does not require approval under the EPBC Act.

## 4. References


- Department of Environment and Resource Management 2011, Wildlife Online Database Search, Queensland Department of Environment and Resource Management, Brisbane, database searched on 8 December 2011.
- Department of Sustainability, Environment, Water, Population and Communities 2011a, EPBC Act Protected Matters Search Report, Australian Government, Canberra, accessed on 16 November 2011.
- Department of Sustainability, Environment, Water, Populations and Communities 2011b, Environment Protection and Biodiversity Conservation Act 1999 Draft Referral guidelines for the nationally listed Brigalow Belt reptiles, Australian Government, Canberra.
- Parsons Brinckerhoff 2011, Wallumbilla gas Treatment Facility Initial Advice Statement, prepared for GLNG Operations Pty Ltd (internal document), Brisbane, Queensland.

PARSONS BRINCKERHOFF

**Attachment 1 - EPBC Act Protected Matters Search Tool Report**

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

# EPBC Act Protected Matters Report

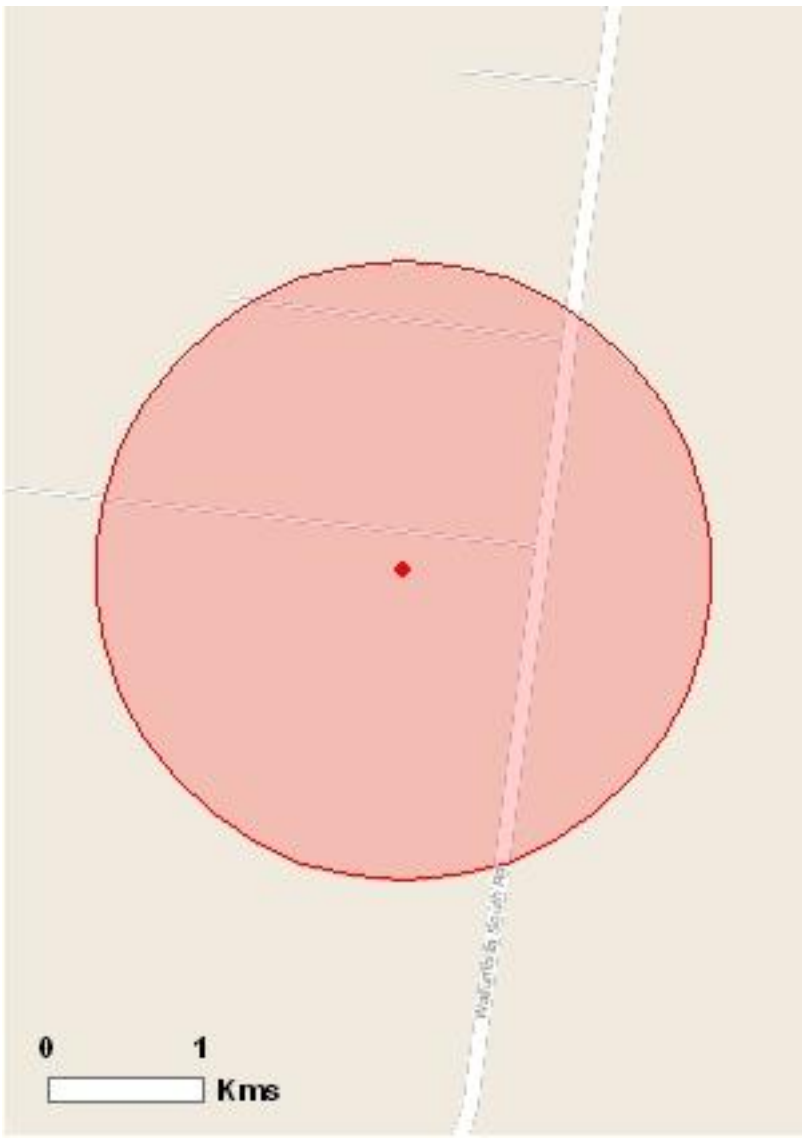
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Report created: 16/11/11 15:36:44








Coordinates

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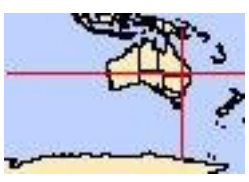

## Summary

### Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International | 1 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Areas: | None |
| Threatened Ecological Communities: | 2 |
| Threatened Species: | 11 |
| Migratory Species: | 10 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.

| | |
|---|---|
| Commonwealth Lands: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 8 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have

| | |
|---|---|
| Place on the RNE: | None |
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 8 |
| Nationally Important Wetlands: | None |

# Details

### Matters of National Environmental Significance

| Wetlands of International Significance (RAMSAR) | [ Resource Information ] |
|---|---|
| Name | Proximity |
| Narran lake nature reserve | Upstream from Ramsar |

| Threatened Ecological Communities | [ Resource Information ] |
|---|---|

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|---|---|
| Coolibah - Black Box Woodlands of the Darling | Endangered | Community may occur |

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|---|---|
| Riverine Plains and the Brigalow Belt South Bioregions | | within area |
| Weeping Myall Woodlands | Endangered | Community likely to occur within area |

## Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| BIRDS | | |
| Geophaps scripta scripta | | |
| Squatter Pigeon (southern) [64440] | Vulnerable | Species or species habitat likely to occur within area |
| Neochmia ruficauda ruficauda | | |
| Star Finch (eastern), Star Finch (southern) [26027] | Endangered | Species or species habitat likely to occur within area |
| Rostratula australis | | |
| Australian Painted Snipe [77037] | Vulnerable | Species or species habitat may occur within area |
| FISH | | |
| Maccullochella peelii peelii | | |
| Murray Cod, Cod, Goodoo [68443] | Vulnerable | Species or species habitat may occur within area |
| MAMMALS | | |
| Chalinolobus dwyeri | | |
| Large-eared Pied Bat, Large Pied Bat [183] | Vulnerable | Species or species habitat may occur within area |
| Dasyurus hallucatus | | |
| Northern Quoll [331] | Endangered | Species or species habitat may occur within area |
| Nyctophilus timoriensis (South-eastern form) | | |
| Greater Long-eared Bat, South-eastern Long-eared Bat [66888] | Vulnerable | Species or species habitat may occur within area |
| REPTILES | | |
| Delma torquata | | |
| Collared Delma [1656] | Vulnerable | Species or species habitat may occur within area |
| Egernia rugosa | | |
| Yakka Skink [1420] | Vulnerable | Species or species habitat may occur within area |
| Furina dunmalli | | |
| Dunmall's Snake [59254] | Vulnerable | Species or species habitat may occur within area |
| Paradelma orientalis | | |
| Brigalow Scaly-foot [59134] | Vulnerable | Species or species habitat known to occur within area |

## Migratory Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Migratory Marine Birds | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat may occur within area |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| **Migratory Terrestrial Species** | | |
| Haliaeetus leucogaster | | |
| White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundapus caudacutus | | |
| White-throated Needletail [682] | | Species or species habitat may occur within area |
| Merops ornatus | | |
| Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat may occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Rostratula benghalensis s. lat. | | |
| Painted Snipe [889] | Vulnerable* | Species or species habitat may occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | [ Resource Information ] |
|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | |
| Name | Threatened | Type of Presence |
| **Birds** | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat may occur within area |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat may occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster | | |
| White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundapus caudacutus | | |
| White-throated Needletail [682] | | Species or species habitat may occur within area |
| Merops ornatus | | |
| Rainbow Bee-eater [670] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Rostratula benghalensis s. lat. | | |
| Painted Snipe [889] | Vulnerable* | Species or species habitat may occur within area |

## Extra Information

| Invasive Species | [ Resource Information ] |
|---|---|

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,

| Name | Status | Type of Presence |
|---|---|---|
| Frogs | | |
| Bufo marinus | | |
| Cane Toad [1772] | | Species or species habitat likely to occur within area |
| Mammals | | |
| Felis catus | | |
| Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus | | |
| Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Sus scrofa | | |
| Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes | | |
| Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| Plants | | |
| Acacia nilotica subsp. indica | | |
| Prickly Acacia [6196] | | Species or species habitat may occur within area |
| Parthenium hysterophorus | | |
| Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566] | | Species or species habitat likely to occur within area |
| Prosopis spp. | | |
| Mesquite, Algaroba [68407] | | Species or species habitat likely to occur within area |

## Coordinates

-26.69525 149.17811

## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence

-State Forests of NSW

-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Please feel free to provide feedback via the Contact Us page.



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