

## Section 8

# LNG Facility Environmental Values and Management of Impacts

## 8.11 Land Use and Infrastructure

### 8.11.1 Introduction

This section describes the existing land use in the vicinity of the LNG facility study area including land activities, features, resources and infrastructure. The local, regional and state planning frameworks for land use matters are also discussed. The land use context of the project and the potential land use and planning impacts are assessed.

### 8.11.2 Methodology

The existing land use values within Gladstone and surrounds (including Curtis Island) are shown in Figure 8.11.2. The land use assessment undertaken includes the impact of the facility's development on these existing values and presents recommendations for managing these impacts.

The LNG facility and associated infrastructure (including product load facility (PLF), materials off loading facility (MOF) and potential bridge) has been examined in the context of relevant land use planning instruments including relevant federal government legislation, state planning policies, local government planning schemes and regional planning schemes. Further information is provided in Appendix V.

### 8.11.3 Regulatory Framework

There are a number of regional planning instruments that apply for the LNG facility site. Details are discussed below and in Section 6.11.3.3 and Appendix C.

#### 8.11.3.1 Commonwealth Plans

##### *Great Barrier Reef Marine Park Zoning Plan 2003*

The *Great Barrier Reef Marine Park Act 1975* aims to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region, including the ecologically sustainable use of the Great Barrier Reef for recreational, economic and cultural activities. The Act provides for zoning plans and plans of management. The Act also establishes the Great Barrier Reef Marine Park Zoning Plan 2003 which provides for the establishment, control, care and development of the Great Barrier Reef Marine Park and is the primary planning instrument for the conservation and management of the Marine Park.

#### 8.11.3.2 Regional Planning Framework

##### *Central Queensland Regional Growth Management Strategy*

The LNG facility is located in Sub-region 3 of the strategy. Refer to Section 6.11.3.1 for further details.

#### 8.11.3.3 State Planning Provisions

##### *SPP 1/92 - Development and Conservation of Agricultural Land*

Refer to Section 6.11.3.2 for the policy principles of SPP 1/92. No agricultural land quality data were available for Curtis Island.

##### *SPP 1/03 - Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*

SPP 1/03 aims to mitigate the adverse impacts of flood, bushfire and landslide for assessable development. The SPP applies generally throughout Queensland, including the LNG facility site. The policy sets out outcomes for development subject to the policy.

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Refer to Section 6.11.3.2 for further details.

### ***SPP 2/02 - Planning and Managing Development Involving Acid Sulfate Soils***

Refer to Section 7.11.3.2 for the purpose of the policy to ensure that the development in low-lying coastal areas is planned and managed to avoid the generation of acid sulphate soils (ASS).

### ***SPP 1/02 - Development in the Vicinity of Certain Airports and Aviation Facilities***

SPP 1/02 sets out broad principles for protecting airports and associated aviation facilities from encroachment by incompatible developments in the interests of maintaining operational efficiency and community safety. The Gladstone Airport has been identified under SPP 1/02 as an airport/aviation facility of state significance and as such the SPP applies.

SPP 1/02 sets out outcomes for development subject to the policy. Land use related outcomes which should be considered in relation to the development include:

- *“When undertaking development to which this SPP applies, adverse effects on the safety and operational efficiency of operational airspace and the functioning of aviation facilities are avoided”;*
- *“...Within areas defined by the 20 ANEF10 contour around airports to which this SPP applies, material changes of use are compatible with forecast levels of aircraft noise”.*
- *“Development within the public safety areas at the ends of airport runways avoids significant increases in people living, working or congregating in those areas; and the use or storage of hazardous materials”.*

### ***Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004***

The *Marine Parks Act 2004* (Qld) (MPA) provides for the conservation of the marine environment through an integrated strategy including (among other things) the establishment of marine park zones, designated areas and highly protected areas within marine parks. The MPA also sets out various permitting and licensing requirements to carry out activities within declared marine park zones.

Relevant to the LNG facility, and in particular the potential bridge and gas transmission pipeline, is the Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004 (MPGBRC Zoning Plan). The bridge (in part) and the gas transmission pipeline are to be located within The Narrows which falls within the Habitat Protection Zone of the MPGBRC Zoning Plan. Under the MPA, the MPGBRC Zoning Plan applies the zoning plan for the Great Barrier Reef Marine Park; however the decision maker is the Environmental Protection Agency (EPA).

Permission is required to enter or use the Habitat Protection Zone for certain purposes. The main purposes for which permissions can be sought are those set out in the Commonwealth Great Barrier Reef Marine Park Zoning Plan 2003 (for the corresponding Commonwealth Habitat Protection Zone). Most relevant is the requirement for a permission to operate a facility (which includes, among other things, building structures) and to carry out works (which includes, among other things, dredging).

### ***Curtis Coast Regional Coastal Management Plan***

The Curtis Coast Regional Coastal Management Plan (Curtis Coastal Plan) is a mechanism for implementing coastal zone management within the Curtis Coast region (which includes Port Curtis). This has been developed within the policy framework established by the State Coastal Management Plan — Queensland’s Coastal Policy (State Coastal Plan) and the *Coastal Protection and Management Act 1995* (Coastal Act).

The Coastal Act gives regional coastal management plans, including the Curtis Coastal Plan, the status of statutory instruments. State coastal plans and regional coastal plans are relevant when decisions are made about coastal management. The Curtis Coastal Plan is also a state planning policy under the *Integrated Planning Act 1997* (IP Act). The Curtis Coastal Plan is a relevant consideration when making planning, development and management decisions within the Curtis Coast Region under the IP Act.

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The Curtis Coastal Plan applies to the coastal zone as defined in the Coastal Act under Section 11 as: “coastal waters and all areas to the landward side of coastal waters in which there are physical features, ecological or natural processes or human activities that affect, or potentially affect, the coast or coastal resources”. The LNG facility, PLF and MOF are thus subject to the Curtis Coastal Plan.

The Curtis Coastal Plan has identified 13 key coastal sites that contain coastal and other resources that require special coastal management. The LNG facility site is within the Curtis Island Coastal Site and the proposed MOF are within the Gladstone Harbour Coastal Site. The potential access bridge and associated infrastructure are within The Narrows Coastal Site.

### 8.11.3.4 Local Government Planning Schemes and other Regulatory Provisions

#### Gladstone State Development Area

The Gladstone State Development Area (GSDA) is an area of approximately 28,000 ha. It comprises a number of precincts located both to the north-west of Gladstone (on the mainland) and on the southern section of Curtis Island. The GSDA has been designated by the Queensland government predominantly for industrial use and development. The location of the GSDA is shown in Figure 8.11.1. The GSDA was established in 1993 as a ‘State Development Area’ for large-scale industrial development under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The aim of the GSDA is to provide land suitable for large-scale industrial development that conforms to acceptable engineering, environmental and social criteria. The Queensland Government holds all land within the GSDA in freehold title. It is managed by the Coordinator-General (CG) and is subject to land use and planning controls set out in the Development Scheme for the Gladstone State Development Area (GSDA development scheme) and supporting policies.

The GSDA development scheme outlines the land use planning approval process for applications for material change of use (planning) for all projects located within the GSDA. It sets out the objectives and guidelines for future land use in each precinct as well as establishing procedures for assessment of applications for material change of use (planning). The development scheme applies to development applications that would otherwise require a material change of use (planning) application to the Gladstone Regional Council.



The GSDA consists of 10 land use precincts which establish designated land uses deemed to be suitable in each precinct. The LNG facility site is located in the Curtis Island Industry Precinct. The purpose of the Curtis Island Industry Precinct is stated as follows:

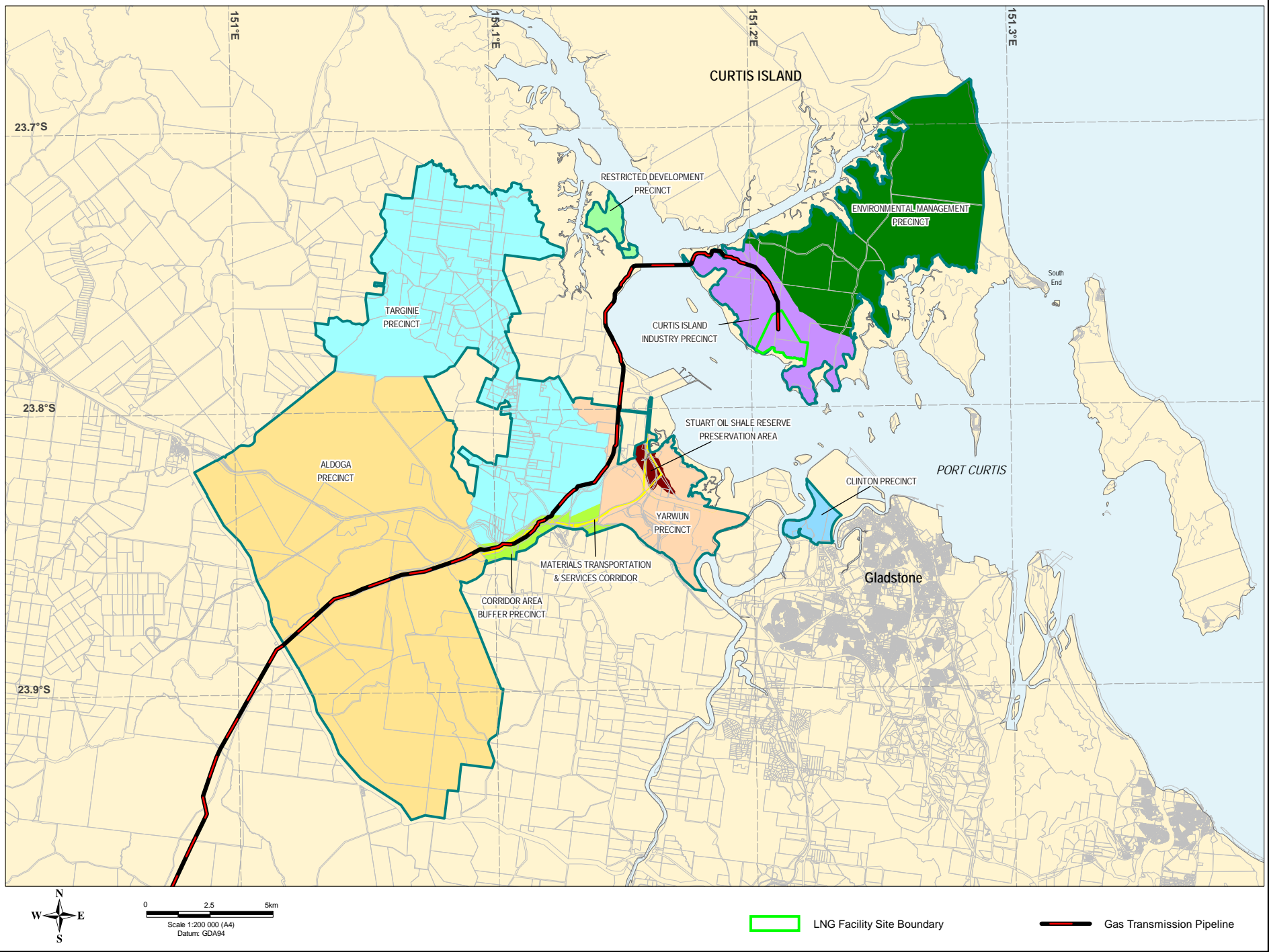
- “To provide for the establishment of liquefied natural gas (LNG) facilities for processing operations (including liquefaction and storage) of national, state or regional significance that require access to export wharf facilities”;
- “To provide for establishment of infrastructure associated with LNG facilities including transport linkages to wharf facilities”;
- “To have regard to the physical characteristics of the land when considering the location of the industrial development”;
- “To prevent the establishment of uses that may be incompatible with, adversely affect, or constrain existing or future LNG processing operations within the Curtis Island Industry Precinct”; and
- “To provide for the physical separation of significant industrial and infrastructure activities within the Curtis Island Industry Precinct from the adjoining Environmental Management Precinct”.

On this basis it can be seen that the proposed LNG facility is consistent with the purpose of the Curtis Island Industry Precinct.

#### Local Government Planning Schemes

Gladstone City Council and Calliope Shire merged together in March 2007 to form Gladstone Regional Council as part of the local government amalgamation and reform process. However, the planning schemes of the two former LGAs are still valid.

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ENVIRONMENTAL IMPACT STATEMENT GLADSTONE LNG PROJECT		Title GLADSTONE STATE DEVELOPMENT AREA (GSDA) PRECINCTS
Figure: 8.11.1		
Rev: B A4		



 LNG Facility Site Boundary       Gas Transmission Pipeline

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### Calliope Planning Scheme

Curtis Island and the GSDA precincts (on the mainland only) are identified within the Calliope Planning Scheme. The GSDA is identified under the scheme as the Gladstone State Development Area Locality. The planning scheme has not yet been updated to include the new GSDA precinct areas on Curtis Island.

### Gladstone City Planning Scheme

There may be some aspects of the development (such as the mainland barge loading facilities, workforce car parks or workers accommodation) that may be situated outside of the GSDA but within the jurisdiction of the Gladstone Regional Council. These project aspects could be subject to requirements of the IP Act and the relevant local government planning scheme.

### ***Gladstone Ports Corporation Land Use Plan***

The Gladstone Port Authority Strategic Plan - 2045 50 Year Horizon shows future wharves ("Curtis Wharves") at China Bay. The plan states that "these wharves could serve as metal plant and coal to oil conversion plant with a total throughput of 7 Mtpa". "Map 1 on page 30 of the plan suggests future infrastructure around the port and shows a potential bridge from the mainland to Curtis Island in the vicinity of the proposed bridge. The proposed PLF at the LNG facility and the proposed bridge to Curtis Island would be consistent with the intent of the plan.

In 2008, the Gladstone Ports Corporation (GPC) updated its 50 Year Strategic Plan. This updated plan shows future port development in the south-west of Curtis Island. The plan states "*At North China Bay, a potential two berths could accommodate future LNG exports, while Hamilton Point and Boatshed Point would be developed for bulk, container or break bulk trade. Safe passage can be provided for Capesize vessels.*" Development of the GLNG Project would be consistent with this intent.

## **8.11.4 Existing Environmental Values**

### **8.11.4.1 Current Land Use**

The proposed LNG facility (including LNG facility, MOF and the PLF) will be located at the south-west end of Curtis Island. The facility site area is approximately 190 ha. The proposed MOF and PLF sites will be located in Port Curtis and will include construction on intertidal land.

The land use of the area surrounding the LNG facility site is shown on Figure 8.11.2.

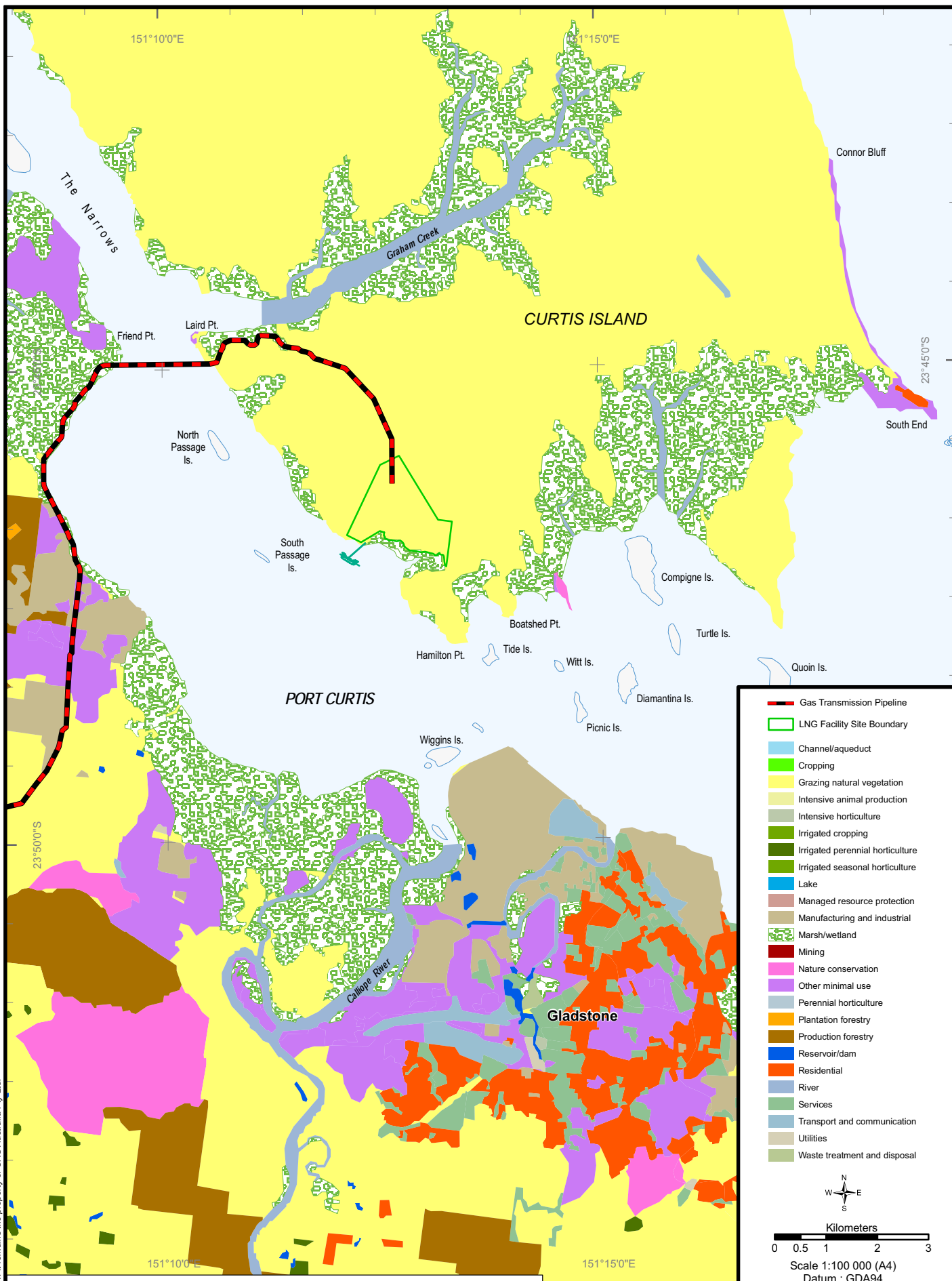
### ***Agricultural Land***

The proposed LNG facility site and surrounds are currently used for grazing cattle purposes.



### ***Residential Areas***

The small settlement of South End is located at the south-east end of Curtis Island, approximately 8.5 km from the proposed LNG facility site. There are approximately 50 dwellings in South End, with approximately 20 permanent residents and 90 seasonal residents. South End has no road access but is serviced by a barge from Gladstone. There is a local aircraft landing strip which is used in case of emergency. The local store (Capricorn Lodge) is a focal point for the community and is generally open four to five days per week. It provides limited grocery supplies and fuel as well as serving alcohol and counter meals.

Other small islands in Port Curtis contain permanent or seasonal residents including She Oak Island, Tide Island and Compigne Island.



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### *Commercial/Industrial*

Gladstone is a regional industrial centre with a population of approximately 30,000. The administrative and commercial centre of Gladstone is on the southern side of Port Curtis, within 6 km of the LNG facility site.

Gladstone is a significant industrial centre within Queensland, containing a number of major international industries. These include:

- QAL Alumina Refinery (QAL) is one of the world's largest alumina refineries. Current production is in excess of 3.65 Mt/y of alumina.
- Boyne Smelters Limited (BSL). BSL is the country's largest aluminium smelter, producing 500,000 t/y of aluminium. BSL converts alumina into aluminium in an electrolytic reduction process.
- Gladstone Power Station (GPS). GPS is one of Queensland's largest coal-fired power stations and supplies electricity to the state's electricity grid.
- RG Tanna Coal terminal. This coal terminal has a capacity of approximately 45 Mt/y and exports coal that has been mined from a number of central Queensland coal mines.
- Cement Australia. This plant processes limestone, clay, silica and ironstone to produce 1.6 Mt/y of cement.
- Orica Australia. The Orica chemical plant annually produces 9,000 tonnes of chlor-alkali, 220,000 tonnes of explosive grade ammonium nitrate and 34,000 tonnes of sodium cyanide.
- Yarwun Alumina Refinery (YAR). Stage 1 of YAR has the capacity to produce 1.4 Mt/y of smelter grade alumina. It is currently being expanded to double its capacity.

A number of other significant industries have been approved or are seeking approval in the Gladstone area.

The state government has recently amended the GSDA so that Curtis Island has been identified as an area for further industrial development (predominantly for LNG projects).

With the exception of BSL and QAL which are located on the south eastern side of the city, the bulk of the area's heavy industry is located to the north of Gladstone.

The Port of Gladstone is a natural deep-water port which is managed by GPC. The Port of Gladstone is Queensland's largest multi-commodity port and permits a wide range of shipping operations including bulk carrier loading and unloading, fuel loading facilities and a dedicated container terminal (GEIDB, 2008). The port, which allows for vessels of up to 220,000+ dead weight tonnes, has six wharves that can simultaneously berth 14 vessels along a 20 km foreshore (GEIDB, 2008).

The port is currently undergoing expansion. The RG Tanna Coal terminal was expanded in 2007 and the Wiggins Island Port development is proposed as another significant export terminal for loading/unloading of coal and other products.

### *Commercial Fishing*

A commercial fishing fleet is located in Gladstone Harbour. The harbour is also a base for recreational boating activities. There is significant boating activity through The Narrows (the passage of water separating Curtis Island from the mainland), however trawling and commercial vessel movement is restricted in the Marine Park area north of Lizard Point. Grahams Creek is used as a safe anchorage during stormy weather.

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### Conservation and Forestry

There are a number of conservation and forestry areas in proximity to the LNG facility site. These are listed in Table 8.11.1 and shown in Figure 8.11.3.

**Table 8.11.1 Conservation and Forestry Areas**

Conservation/Forestry Area	Location
<b>National Park/Conservation Areas</b>	
Garden Island Conservation Park	2 km east of project site
Curtis Island National Park	5 km north of project site
<b>Marine Park</b>	
Great Barrier Reef Marine Park	Only on ocean side of Curtis Island
Great Barrier Reef Coast Marine Park	The Narrows
<b>Areas of State Significance – Scenic Coastal Landscapes</b>	
Islands and offshore features	Curtis Island
Coastal wetlands; Estuaries and inlets	The Narrows
Coastal Headlands	Curtis Island
<b>Areas of State Significance – Natural Resources</b>	
Significant Coastal Wetlands	Curtis Island
<b>Fish Habitat Areas</b>	
Fitzroy River FHA	Northern end of Curtis Island
Colosseum Inlet; Rods Harbour	20 km south of project site
<b>State Forest</b>	
Curtis Island State Forest	5 km north of project site

#### 8.11.4.2 Land Tenure

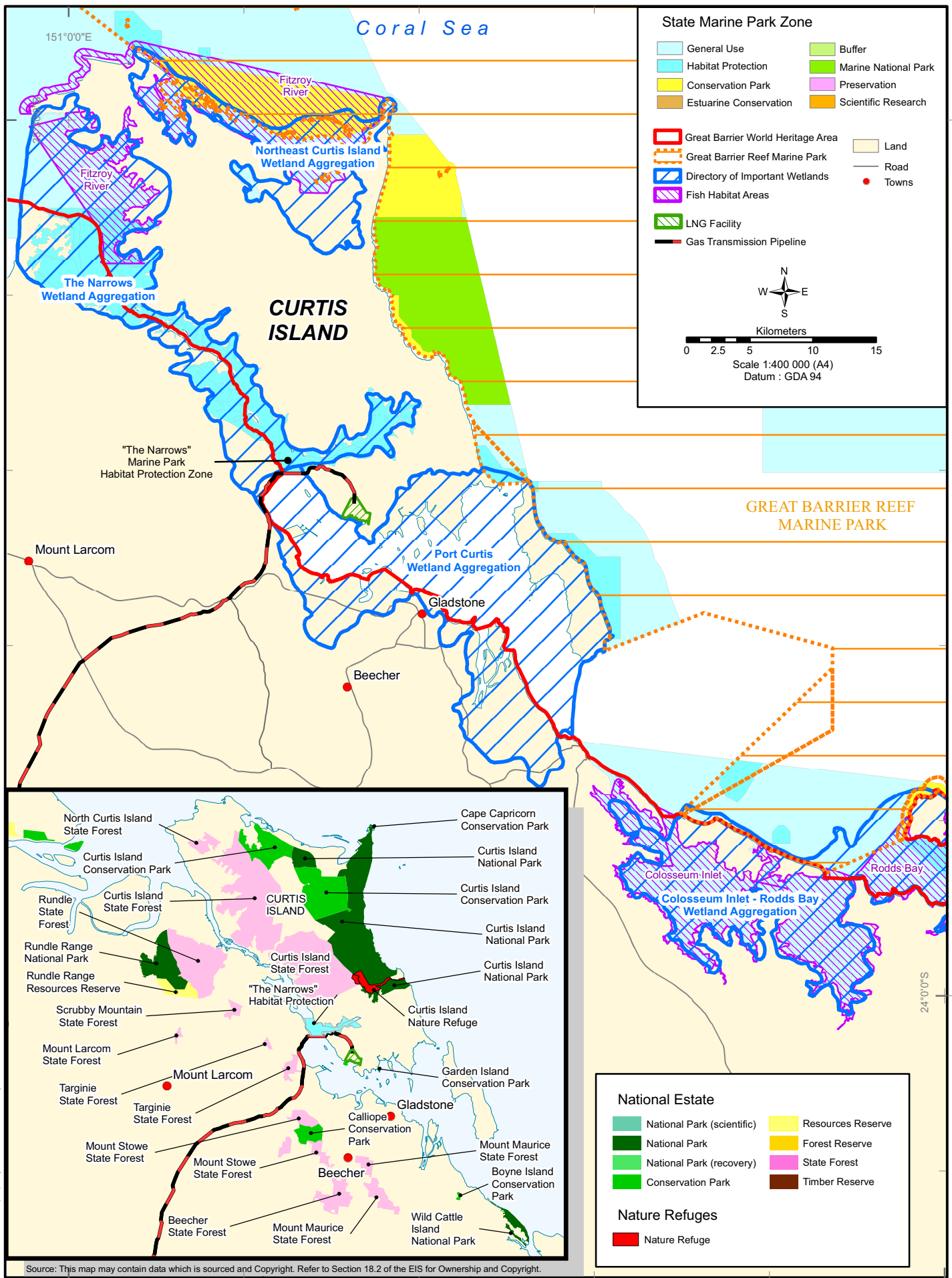
The LNG facility site is predominantly on land which is owned partly by Santos (as freehold) and partly by the Department of Infrastructure and Planning (as freehold). Table 8.11.2 shows the land tenure for the LNG facility and Figure 8.11.4 shows tenure of the site and surrounding area.

**Table 8.11.2 LNG Facility - Land Tenure**

Lot/Plan	Tenure
Lot 7 on DS220	Freehold (owned by the State of Queensland [represented by Department of Infrastructure and Planning])
Lot 9 on DS220	Freehold (owned by Santos)
Lot 10 on DS220	Freehold (owned by the State of Queensland [represented by Department of Infrastructure and Planning])



Data used for the assessment of the tenures for the GLNG project was current as at February 2009 however, changes to this data could have taken place since then.

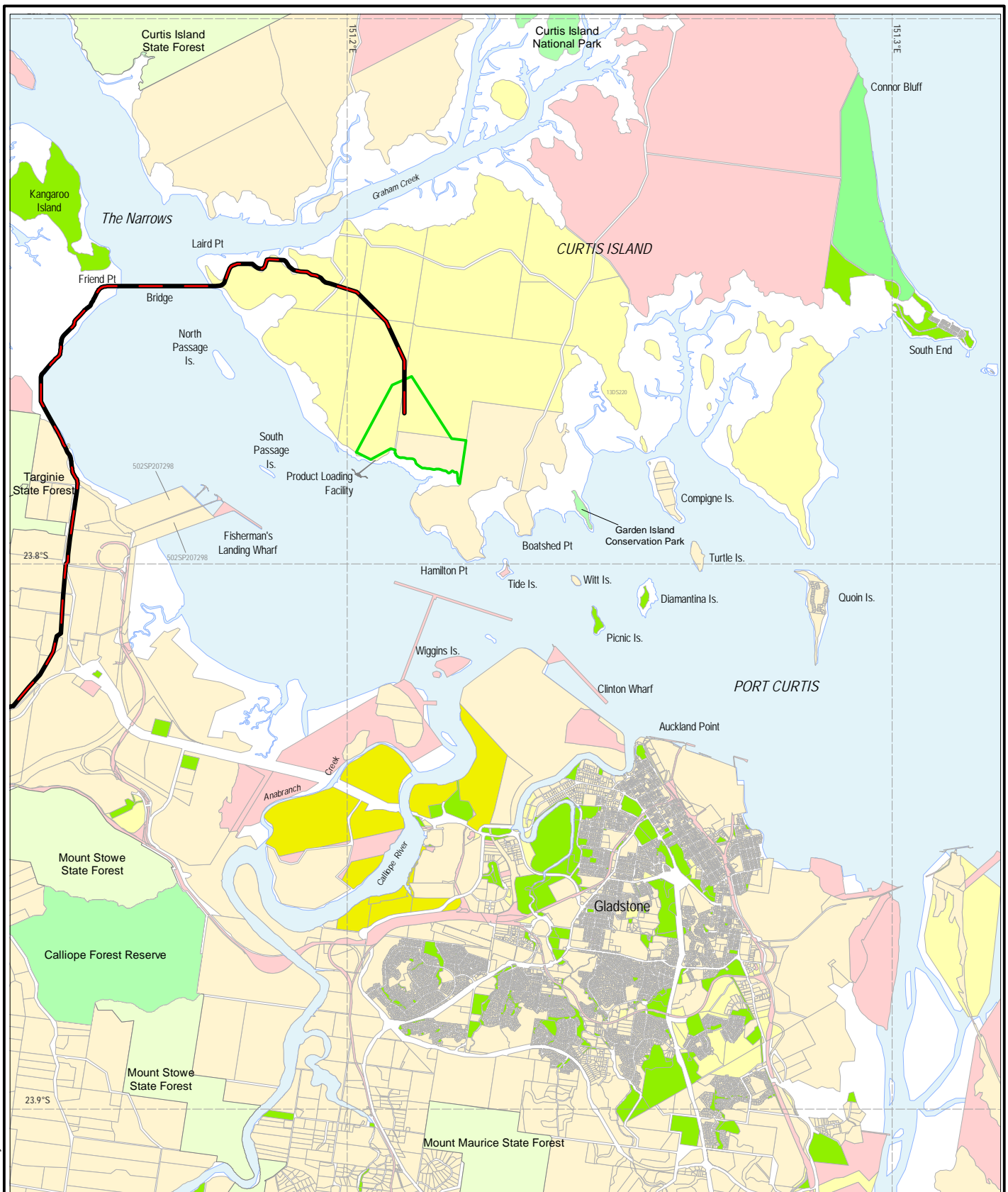




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### 8.11.4.3 Infrastructure and Services

There is no all weather road access to the LNG facility site. A rough four wheel drive track does link the site with South End, and there are a number of unsealed tracks traversing the site.

There are no electricity, water or other infrastructure services within or adjacent to the site.

### 8.11.4.4 Extractive Resources

There are no known deposits of economic extractive resources in the vicinity of LNG facility site.

### 8.11.4.5 Native Title and Aboriginal Cultural Heritage

#### *Heritage/Historic Areas*

Searches were conducted of the statutory and non-statutory heritage registers and databases for items of known heritage significance within the LNG facility study area. Heritage registers reviewed included:

- World Heritage List;
- National and Commonwealth Heritage Registers;
- Register of the National Estate;
- Queensland Heritage Register;
- Local authority registers; and
- National Trust of Australia (Qld) Register.

A number of natural and cultural heritage places in the study area are recorded in the Register of the National Estate, Queensland Heritage Register and National Trust of Australia Register. Further details are provided in Section 8.13.

#### *Native Title*

There is a registered native title claim group at the LNG facility being Port Curtis Coral Coast (QC01/029).

The group is afforded rights under the Aboriginal Cultural Heritage Act (ACHA) to enter into agreements with respect to Aboriginal cultural heritage. These groups, and their relevant areas, are identified in Table 6.13.1.

### 8.11.5 Potential Impacts and Mitigation Measures

#### 8.11.5.1 Impacts on Existing Land Use

##### *Agriculture*

Cattle grazing on the site will cease prior to the construction of the LNG facility commencing. The site will be fenced and the surrounding land which is also used for grazing will not be affected by the project. The land is not considered to be good quality agricultural land (GQAL) – refer to Section 8.3 for more details.

##### *Residential*

#### Construction Phase

The nearest residential area on Curtis Island is South End which is 8.5 km from the LNG facility site. The nearest residents on the mainland are 6.5 km away. At these distances there will be no significant noise or dust impacts to residents due to construction activities (refer Sections 8.10 and 8.8 respectively for more details).

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There is an isolated residence on Tide Island which is 2 km to the south of the LNG facility site. The noise and dust impacts on this residence from construction activities are discussed in Sections 8.10 and 8.8.

Accommodation for the construction workforce will be provided in a construction accommodation facility (CAF) to be located on Curtis Island adjacent to the project site. The CAF will be completely self-contained and will provide the housing, dining, logistics and recreation facilities for the residents. Worker access to areas on Curtis Island outside of the designated construction site will be restricted. The accommodation facility will also provide essential services such as water supply, sanitation and waste management. Other general facilities will include an administration office, contractors' construction offices, parking for work vehicles and a service area.

The construction workforce will be prohibited from visiting South End during their roster period. They will be restricted to the project site whilst on the island and will be ferried back to the mainland when they are off roster. In this way there will be no interference with existing South End services and facilities.

A project-specific MOF will be constructed adjacent to the facility site to ensure that there will be no disruption to South End residents from the transfer of workforce personnel, plant and equipment to the site prior to the bridge being constructed.

### Operations Phase

The amenity of existing residents located on Curtis Island and Gladstone will not be affected by noise or air quality impacts from the operation of the facility. The noise and dust impacts on these residential areas from operations activities are discussed in Sections 8.10 and 8.8 respectively.

Due to the undulating topography separating South End and the LNG facility site, the LNG facility will not be visible from South End apart from the flare stack which, at 8.5 km away, will be barely visible (refer Section 8.12 for more details). The stack and the LNG storage tanks will be visible from Gladstone. The facility will emit light at night, similar to other industrial facilities in Gladstone. The facility's visual effects and proposed mitigation measures are discussed in Section 8.12.

Should it be built, the access road linking the bridge to the LNG facility site will be limited to project vehicles only, with public access prohibited. The LNG facility will not require the construction of any road connections between South End and either the facility site or the bridge.

### **Conservation and Forestry**

The potential impacts of the LNG facility development on environmentally sensitive areas or areas of high conservation status (such as marine parks or national parks) and proposed mitigation measures are discussed in Section 8.4.

Clearing will be required on the LNG facility site, for the site access road and the gas transmission pipeline. Vegetation to be cleared in this area may include timber suitable for milling. Santos will advise the Department of Primary Industries and Fisheries (DPIF) about any areas of state owned land likely to be affected by the project. The DPIF will be able to survey for millable timber in these areas and arrange for their prior removal if required. Similarly, should there be any millable timber on the LNG facility site or other privately owned land that is likely to be affected by the project, Santos will liaise with the relevant landowner to provide the opportunity for the removal of such timber prior to construction occurring.

### **Commercial/Industrial**

The LNG facility is consistent with the Queensland Government's regional vision for the area, which identifies the GSDA as a major industrial development area. The LNG facility site is located within the proposed Curtis Island Industry Precinct of the GSDA. This precinct is the preferred location for LNG developments and could include several of the LNG plants proposed for Gladstone. The facility will also be compatible with the GPC's 50 Year Strategic Plan, which identifies the south western section of Curtis Island as a suitable location for berths to accommodate future LNG exports.

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### *Recreational Fishing*

For safety reasons fishing and recreational boating activities will be prohibited around the PLF during the loading of ships. There will also be an exclusion zone around the loading facility even when ships are not loading. An exclusion zone of approximately 200 m radius will apply (this figure to be confirmed at completion of front end engineering design (FEED)). In addition, there will be no public access to the site or to the intertidal areas along the site's frontage to Port Curtis. Recreational activities outside of these areas will not be affected.

During bridge construction, there may be limitations placed on recreational traffic around areas of construction activity. These limitations will be agreed with the GPC prior to implementation.

The Narrows is a popular location for recreational boating including tall masted sailing yachts. A survey of recreational boats in Gladstone in August 2008 found that 70 % of vessels surveyed were sailing yachts, which confirms the popularity of the waterways in the Gladstone region for recreational boating pursuits. The potential bridge to Curtis Island will be located at the entrance to The Narrows from Port Curtis which is a popular route for recreational boating. Its conceptual design provides for a vertical bridge clearance of 20.5 m above highest astronomical tide level and 23.0 m above mid tide level with a horizontal clearance between piers of 30 m within the region of the main waterway channel. This clearance envelope has been adopted to allow for the movement of recreational vessels between Port Curtis and The Narrows. Boats with a need for greater a clearance would be restricted.

### **8.11.5.2 Impacts on Infrastructure and Services**

The facility will be self contained for services such as power, water and telecommunications and these services will be restricted to the site. Existing access tracks around and off the site will be closed for use by Santos workers. Existing tracks that pass through the site will be closed off from non-project personnel. There will be no other existing infrastructure services at the site that will be affected by the project.

A common user access and infrastructure corridor is proposed to be established by the Queensland Government connecting Curtis Island to the mainland. If established, the corridor will enable the co-location of access facilities, gas pipelines and any other services required for the LNG facility and other LNG developments on Curtis Island and would minimise the cumulative footprint of such developments.

Santos agrees that the costs of infrastructure development should be borne by those who benefit. However, Santos also recognises that there has been a long history in Queensland of government support for coal, alumina, gas and other resource projects. The Queensland (and Federal) Governments have played leading roles in the development of some of these industries and associated common user infrastructure.

The key new infrastructure requirements of the Queensland LNG industry include:

- Bridge and road infrastructure at Gladstone to access the LNG precinct on Curtis Island;
- Raw water (subject to further study of availability and cost);
- Telecommunications infrastructure;
- Channels and swing basins for shipping access to LNG facility;
- Tug fleet, navigational aids, pilots and associated vessels to support safe navigation of LNG shipping;
- Access to GSDA land for plant and pipeline corridor;
- Integration with regional emergency services; and
- Marine transportation requirements for access to Curtis Island including marshalling areas for personnel and equipment, access to wharves for personnel transfer.

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### 8.11.5.3 Impacts on Extractive Resources

As there are no known extractive resource deposits identified in the vicinity of the LNG facility site there are no perceived impacts.

### 8.11.5.4 Impacts on Cultural Heritage and Native Title

#### *Cultural Heritage Impacts*

Section 8.13 provides details on cultural heritage sites (Indigenous and non-indigenous) identified within the LNG facility study area. These sites have been assessed for significance and LNG facility development activities will be undertaken in such a way as to minimise any impacts on identified sites (refer Section 8.13 for further details).

#### *Native Title Impacts*

Santos will seek to gain relevant native title permissions for the GLNG Project via the negotiation and registration of Indigenous Land Use Agreements (ILUAs) or the grant of Ministerial permissions under the *Petroleum and Gas (Production and Safety) Act 2004* (PG (PSA)) where ILUAs are not achievable. Native title permissions will be required for the pipeline (and related elements) and some areas of the LNG facility site and related construction. ILUAs are being negotiated with the registered native title claim groups covering the pipeline and the plant areas of the project.

### 8.11.5.5 Impacts on Commonwealth Plans

The Great Barrier Reef Marine Park Authority regulates the entry and use of the Great Barrier Reef Marine Park by ships and other vessels through the Great Barrier Reef Marine Park Zoning Plan 2003 (the zoning plan).

The Great Barrier Reef Marine Park is to the east of Curtis Island and outside of Port Curtis and will not be affected by the operation of the LNG facility. However the LNG vessels will transit through the marine park. As prescribed by the zoning plan, ships may transit the marine park through the general use zone or through other designated shipping areas by permit.

The shipping area designated in the zoning plan is designed to minimise the potential impact on the shipping industry whilst having regard for Australia's international obligations. The location of the designated shipping area reflects vessel usage patterns in the inner and outer shipping routes, existing recommended routes, and new routes to allow for growth in shipping.

Further details are provided in Section 10.3.3.1.

### 8.11.5.6 Impacts on Regional Planning Framework

#### *Central Queensland Regional Growth Management Strategy*

Details of the objectives and outcomes in relation to the project are outlined in Table 8.11.3.

**Table 8.11.3 Project Compatibility with CQRGMS**

Outcome	Objectives	Compatibility of LNG Facility
<b>Resource Use, Conservation and Management</b>		
Land use planning and management	The promotion of, and adherence to, best practice land management for sustainable and profitable land use.	The LNG facility will be consistent with the government's declared land use plan for the site as expressed through the GSDA Development Plan.

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Outcome	Objectives	Compatibility of LNG Facility
Pests and diseases	The economic prosperity, competitive advantage and biodiversity of the region are protected from introduced and endemic pests and diseases.	Pest and weed control strategies will be implemented to address threat of pests and diseases.
Water use planning and management	The promotion of, and adherence to, sustainable use of water resources while maintaining and enhancing environmental values	Santos is proposing to minimise its demands on the region's water supply system by using desalination to supply the facility with water. The LNG facility will be designed to maximise water use efficiency.
Air quality	Air quality is maintained at levels which ensure sustainable regional communities, protection of the natural environment and opportunities for continuing economic growth.	The predicted cumulative air quality impacts of the LNG facility will be within acceptable guidelines. Air quality mitigation measures are discussed in Section 8.8.
Climate change and greenhouse gas (GHG) emissions	Development takes place with a focus on efficiency to achieve economic progress with minimisation of greenhouse emissions and with an understanding of the potential impact of climatic conditions	LNG is an energy source with significantly lower GHG than other hydrocarbon energy sources. GHG mitigation measures are discussed in Section 8.9.
Biodiversity conservation	Biodiversity in terrestrial, freshwater, marine and estuarine ecosystems is maintained, with native species and communities conserved and linked by viable networks of wildlife habitat across the landscape.	Mitigation and offset strategies will be implemented to minimise biodiversity impacts from the development of the LNG facility.
Coastal planning and management	The region's coastal resources and values have been identified and promoted to ensure they are used in a sustainable manner.	The south-west coastline of Curtis Island has been designated in the GSDA Development Plan as an area suitable for LNG development.
<b>Economic Development</b>		
Existing and emerging industries	The region supports existing and emerging industries and encourages diversification ensuring growth and a viable and ecologically sustainable economy in the region.	The GLNG Project will form the basis of an emerging LNG industry in the Gladstone Region.
Investment and capital markets outcome	There is a measurable increase in the understanding and the flow of capital within the local and regional economies and how this applies to the state, national and international economies.	The GLNG facility will give a significant boost to the local, state and national economies.
Labour market	The provision of a flexible and skilled workforce meeting industry requirements which is capable of responding to both industry and personal changes.	The project will introduce additional skilled workers into the region.

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## LNG Facility Environmental Values and Management of Impacts

Outcome	Objectives	Compatibility of LNG Facility
Export development	It is recognised there is an increased capacity of the region to engage directly with international markets which increases our global perspective and enhances the viability of organisations based in the region.	The LNG produced by the facility will be exported to international markets.
Energy	A region which promotes its capacity to meet high energy demand in an efficient and competitive manner to support economic growth and improvement in lifestyle.	The LNG facility will enable the development of a significant resource to meet the growing demand for lower carbon energy.

The LNG facility development will support the outcomes of the CQRGMS and implement management strategies that reflect those contained within the CQRGMS.

### 8.11.5.7 Impacts on State Planning Policies

#### *SPP 1/03 - Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*

##### Flooding

The LNG facility site is situated across eight small drainage channels. Each channel is ephemeral in nature, with small catchments (less than 5 km<sup>2</sup>). Each channel is a drainage gully for the upper catchment formed from erosive runoff during high intensity storm events. The small feature drains have a channel width varying between 0.3 - 2.5 m and are generally extremely shallow with depths of 0.1 - 1.5 m, however heavily eroded bends have gully features up to 4m in depth. A flood analysis of the site indicates that flood depths in the worse affected drainage channel can vary from 1.1 m for a 1 in 2 year flood event to 1.4 m for a 1 in 100 year event.

The existing drainage channels will be altered due to the earthworks proposed to construct the LNG facility. The design elevation of the facility site is 13.5 m Australian Height Datum (AHD) which is sufficient to protect it from regional flooding. The site's stormwater drainage system will be designed to ensure that local flooding does not occur. Further flooding details are given in Section 8.5.

##### Bushfire Management

On the basis of mapping undertaken by the former Calliope Shire Council, the LNG facility site and surrounds are located within a medium bushfire hazard area (Calliope Town Planning Scheme, 2007).

In accordance with the requirements of the SPP, an incident management plan will be prepared and associated infrastructure will be designed to cope with the likely impacts of a bushfire. Mitigation and management measures to be implemented to minimise the risk and impact of fires from the facility's construction and operational phases are discussed in Section 8.11.6 and summarised in the following table.

**Table 8.11.4 LNG Facility Hazards**

Risk	Cause	Mitigation
Plant fire involving pressure vessel of hydrocarbons.	<ul style="list-style-type: none"> <li>Uncontrolled release and fire of flammable gas.</li> </ul>	<ul style="list-style-type: none"> <li>Ground level contours to drain dense flammable gases away from vessels of hydrocarbons.</li> <li>Fire protection over pressure vessels of hydrocarbons.</li> <li>Emergency response procedures.</li> </ul>



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Risk	Cause	Mitigation
Uncontrolled release of product on PLF.	<ul style="list-style-type: none"> <li>Mechanical failure of pipe / flanges / seals / valves.</li> <li>Connection error.</li> <li>Vessel impact.</li> <li>Earthquake.</li> <li>Sea surge.</li> </ul>	<ul style="list-style-type: none"> <li>Quality assurance of installed equipment.</li> <li>Inspection and condition monitoring.</li> <li>Port control and berthing procedures.</li> <li>Design standards for potential earthquake and sea surge loads.</li> <li>Electrical equipment rating in accordance with hazardous zones.</li> <li>Emergency shut-down system with remote isolation of storage vessels.</li> <li>Emergency response procedures.</li> </ul>
Fire in process plant.	<ul style="list-style-type: none"> <li>Electrical fault.</li> <li>Hot work.</li> </ul>	<ul style="list-style-type: none"> <li>Hot work procedure.</li> <li>Installation of electrical equipment to electrical standards.</li> <li>Fire separation of critical equipment.</li> <li>Condition monitoring of switch gear and transformers.</li> <li>Fire detection in switch rooms.</li> <li>Fire protection in switch rooms and over transformers.</li> <li>Fire walls shielding critical equipment from transformers.</li> <li>Secondary containment of equipment with liquid combustible materials.</li> </ul>
Gas explosion during maintenance or decommissioning.	<ul style="list-style-type: none"> <li>Flammable vapour in unpurged vessel.</li> </ul>	<ul style="list-style-type: none"> <li>Decommissioning plan.</li> <li>Confined space procedure.</li> <li>Hot work procedure.</li> </ul>

### Landslide

Lots 10D on S220, 7D on S220 and 9D S220 within the project site contain slopes greater than 15 % and hence are categorised as a landslide natural hazard management area under the SPP. Earthworks associated with the site's development will level much of the site so that there will be no slopes greater than 15 % around the plant. All slopes remaining on the site will be engineered to ensure they are stable.

### ***SPP 2/02 - Planning and Managing Development Involving Acid Sulfate Soils***

Areas of the LNG facility site have been identified in the Calliope Shire Planning Scheme as containing Acid Sulfate Soils (ASS). Details of the ASS studies at the site and the procedures to be adopted to manage and control ASS impacts are discussed in Section 8.3.

### ***SPP 1/02 - Development in the vicinity of certain Airports and Aviation Facilities***

Gladstone airport is 9.5 km away from the LNG facility site. At this distance the site is well beyond the 20 Australian Noise Exposure Forecast contour which is an approximate indication of the extent of noise annoyance from airport operations. Aircraft noise will not have any detrimental effect on noise levels at the LNG facility site.

The effects of the facility's air emission plume rise on aircraft operations are discussed in Appendix CC.

### **8.11.5.8 Impacts on Great Barrier Reef Coast Marine Park Zoning Plan**

The Narrows north of a line between Friend Point and Laird Point is located in the Great Barrier Reef Coast Marine Park (Queensland) (GBR Coast MP) which extends approximately three nautical miles seaward from highest astronomical tide within the Great Barrier Reef World Heritage Area. The Great

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Barrier Reef Marine Park (Commonwealth) (GBRMP) extends seaward from the GBR Coast MP. The GBR Coast MP complements the GBRMP by adopting similar zone objectives and use provisions.

In the zoning plans for both marine parks, The Narrows is located in the Habitat Protection Zone. The objectives of the Habitat Protection Zone are:

- To provide for the conservation of areas of the Marine Park through the protection and management of sensitive habitats, generally free from potentially damaging activities; and
- Subject to the objective mentioned above, to provide opportunities for reasonable use.

The zoning plan allows for a number of uses within the Habitat Protection Zone both with and without permission.

Carrying out works for a purpose that is consistent with the objectives mentioned above including:

- Dredging;
- Placement of dredged material;
- Reclamation;
- Beach protection works;
- Harbour works; or
- Any other purpose that is consistent with the objectives mentioned above and not already listed in the plan.

Based on the zoning plan's objectives and permitted uses, it is evident that "reasonable use" (including dredging, dredged material placement, reclamation, beach protection works or harbour works) may be permitted provided that conservation areas and sensitive habitats are protected and managed and free from potentially damaging activities.

As discussed in Section 3.7.3.20, the gas transmission pipeline will cross Port Curtis between Friend Point and Laird Point to the north of the proposed location of the potential bridge. This will place the pipeline within the marine park. The bridge will also be partially within (eastern end) the marine park. This location is at the southern extremity of the Habitat Protection Zone.

While much of The Narrows contains significant marine habitats including extensive areas of seagrass and mangroves, the habitats in the vicinity of the potential bridge and pipeline (between Friend Point and Laird Point) are less significant. The habitats in this area are described in Section 8.4 as follows:

- **Benthic Habitat.** The benthic habitat near Friend Point is primarily silt with numerous small and large burrows. Strong currents occur around Friend Point creating a scouring effect on the benthic substrate. In the centre of the channel the benthic substrate is coarse sand with a high proportion of shell grit. The proportion of silt increases towards Laird Point with lesser amounts of sand and shell grit.
- **Seagrass.** Surveys in the area north of Fisherman's Landing found a varying extent of seagrass between 2002 and 2006. This seagrass variability has been attributed to their patchy extent in this area with low overall biomass and lower resilience and no substantial seed bank to support rapid regeneration of seagrass species. Additional surveys undertaken for this EIS in 2008 found minimal seagrass at the subtidal sites and highly patchy seagrass north of Fisherman's Landing in the intertidal zone (however these surveys were undertaken in autumn when biomass and area would be expected to be reduced).
- **Mangroves.** In the extensive tidal flat areas south-west of Friend Point there are several isolated stands of dead and fallen mangroves, possibly resulting from storm events and/or shoreline erosion. The sediment has been undermined from the mangrove fringes in this area as a result of tidal surges receding rapidly through the mangrove forest during spring tides. Localised areas of mangrove mortality are also present resulting from root smothering in areas where mobile sand ridges (cheniers) have moved into the mangrove forest covering the aerial breathing root systems.

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To satisfy the objectives of the GBR Coast MP, a permitted use must not interfere with the protection and management of sensitive habitats and must be for a reasonable use. Based on the above habitat descriptions, it can be seen that the habitats to be disturbed by the proposed pipeline and bridge are not specially significant particularly when compared with the more extensive seagrass and mangrove areas further north in The Narrows. Furthermore it is considered that the provision of vital infrastructure to a major LNG precinct on Curtis Island that is consistent with the strategic planning intent of the Queensland Government (as expressed in the GSDA development plan) is a reasonable use. On this basis it can be concluded that the proposed pipeline and bridge will be consistent with the objectives of the GBR Coast MP.

### 8.11.5.9 Impacts on Curtis Coast Regional Coastal Management Plan

Tables 8.11.5 – 8.11.7 summarise the desired coastal outcomes for the coastal sites as established in the Curtis Coast Regional Coastal Management Plan and the extent to which the GLNG Project will be consistent with them.

**Table 8.11.5 Curtis Island Coastal Site - Desired Coastal Outcomes**

Aspect	GLNG Project Compliance
<b>Desired Coastal Outcomes</b>	
Maintenance of Curtis Island in a generally natural or non-urban state outside existing residential and tourist areas at South End, Black Head, Sea Hill and Station Point while providing opportunities for future development in appropriate locations.	While the plan recognises the need to maintain the island's natural state, it does envisage that the future development of the project site will be "associated with port and industrial expansion". The proposed project is consistent with that objective. Measures will be implemented to minimise disturbance outside of the development footprint.
Maintenance of the integrity and ecological functioning of areas of high conservation significance.	The Curtis Coastal Plan has mapped the mangrove fringe along the frontage of the LNG facility site and Laird Point as areas of high conservation significance. While the facility will avoid the mangrove area there will be some disturbance caused by the construction of the LNG PLF. Should the Laird Point option for dredge material placement be selected, its mangrove and intertidal areas will be disturbed. The project will minimise the area of disturbance and will implement appropriate mitigation strategies where possible (refer Section 8.4.)
Development is sited and designed to protect the island's significant coastal resources and their values including protection of the island's scenic coastal landscapes.	The Curtis Coastal Plan has mapped the mangrove fringe along the frontage of the LNG facility site and Laird Point as areas of high scenic value. While the facility will avoid the mangrove area there will be some disturbance caused by the construction of the PLF. The Laird Point dredge material placement facility will involve the replacement of mangrove and intertidal areas with a reclamation area. The project will minimise the area of disturbance and will implement appropriate mitigation strategies where possible (refer Section 8.12.)
Enhancement of low-key recreation and tourism opportunities in appropriate locations.	Recreation and tourism will not be affected beyond the project's site boundaries and marine exclusion zone.
Coordination of management and decision-making among land and marine resource managers in managing adverse impacts on biodiversity from fire, pest species, development and public access.	Management plans will be implemented to control fire and pest species. Public access will not be permitted across the proposed bridge to the island.
Management of forestry operations ensure minimal impact on water quality of The Narrows and the waterways flowing to The Narrows.	There are no current forestry operations on the site. The site will be cleared in manner that will minimise erosion potential and downstream water quality impacts.

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Aspect	GLNG Project Compliance
Decision-making in relation to Curtis Island is based on a sound understanding of the island's coastal resources and their values and potential adverse impacts on these resources and values.	The proposed development is consistent with the intended use for the area as stated in the GSDA Development Scheme. This EIS has assessed the project's impacts on the island's coastal resources and has development appropriate management strategies.
<b>Coastal Management Issues</b>	
Although this coastal locality is undeveloped there is significant potential for future development associated with port and industrial expansion. GPC's Strategic Plan identifies part of this coastal locality for future port development by 2025.	The project is consistent with the intent of "future development associated with port and industrial expansion".
Development of part of this coastal locality for industry and port development has the potential to be a catalyst for further major development on Curtis Island that could have significant adverse impacts on coastal resources and their values. Any future development of this coastal locality needs to be carefully planned and managed in an ecologically sustainable manner to avoid significant impact on the area's biodiversity and coastal landscape values.	The GSDA Development Scheme limits that area of Curtis Island on which industrial development will be permitted and preserves a much larger area as an environmental management area to prevent further major development of the island.  The assessment undertaken in the preparation of this EIS has shown that the project will not have a significant impact on the area's biodiversity or coastal landscape values. Mitigation measures will be implemented to minimise the impacts that have been identified.

**Table 8.11.6 Gladstone Harbour Coastal Site - Desired Coastal Outcomes**

Aspect	GLNG Project Compliance
<b>Desired Coastal Outcomes</b>	
Management of the harbour providing for a range of uses, while ensuring conflicts between these uses are managed and adverse impacts on coastal resources and their values are minimised.	Project shipping will be managed to avoid conflicts with other Port Curtis users. The bridge across The Narrows will be designed to facilitate the passage of recreational boating.
Continued development of the Port of Gladstone in an ecologically sustainable manner avoiding the location of port infrastructure in areas of high conservation significance, where possible.	The LNG facility, MOF and PLF are located in an area that has been identified as being suitable for future industrial and port development. The Curtis Coastal Plan has mapped the mangrove fringe along the frontage of the LNG facility site as an area of high conservation significance. While the facility will avoid the mangrove area there will be some disturbance caused by the construction of the PLF. The project will minimise the area of disturbance and will implement appropriate mitigation strategies (refer Section 8.4).  The Curtis Coastal Plan has mapped the Laird Point as an area of high conservation significance. The Laird Point dredged material placement facility will involve disturbance of mangrove and intertidal areas. The project will minimise the area of disturbance and will implement appropriate mitigation strategies where possible (refer Section 8.4.).
Recognition of the importance of the undeveloped inner-harbour islands in providing public access, recreation, biodiversity and scenic amenity to the regional community and avoidance of development with the potential to compromise these values.	The GLNG project will not involve any development of the inner harbour islands.

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Aspect	GLNG Project Compliance
Coordination of management approaches among land and marine resource managers in relation to monitoring the health of the harbour in regards to water quality, managing increasing vessel use and minimising impacts to shorebirds, turtles and dugong.	Santos will participate in the Port Curtis Integrated Monitoring Program and other relevant regional monitoring programs.
Future use of the following State land on the coast protects coastal resources and values through the implementation of an appropriate management regime: 5DS219, 10SUSL39395, 8USL39395, 9USL39395, 7USL39395, 6USL39395, 11USL39395, 1USL36585 (as shown in Figure 8.11.4).	The project will not involve the development of any of these allotments.
<b>Coastal Management Issues</b>	
A critical issue for Gladstone Harbour is providing for future port and industrial expansion while ensuring significant adverse impacts to coastal resources and their values are minimised.	The GLNG Project will contribute significantly to the expansion of Gladstone Harbour. The assessment undertaken in the preparation of this EIS has shown that the project will not have a significant impact on the area's coastal resources. Mitigation measures will be implemented to minimise the impacts that have been identified.
Dredging of the harbour and sea-placing of spoil has the potential to cause benthic disturbances and increased turbidity in the water column. This can adversely affect marine biodiversity and in particular seagrass beds.	The GLNG Project will implement mitigation measures (refer Section 8.17) to minimise dredging impacts on marine biodiversity.

**Table 8.11.7 The Narrows Coastal Site - Desired Coastal Outcomes**

Aspect	GLNG Project Compliance
<b>Desired Coastal Outcomes</b>	
This key coastal site is given the highest level of protection in recognition of its near pristine state and significant coastal resources and their values.	The potential bridge and pipeline crossing of Port Curtis will be located at the southern extremity of The Narrows Coastal Site and have been designed and constructed to minimise impacts on the coastal marine environment. Environmental Management Plans (EMPs) will be implemented to facilitate this.
Protection of the area's integrity and ecological functioning from incompatible development, land uses and activities.	The potential bridge and pipeline crossing of Port Curtis will be located at the southern extremity of The Narrows Coastal Site and have been designed and constructed to minimise impacts on the coastal marine environment. EMPs will be implemented to facilitate this.
Maintenance of the mangrove fringe bordering The Narrows and associated waterways to protect scenic amenity and water quality.	The potential bridge has been located to minimise the need to clear mangroves. Approximately 4 ha will need to be cleared on the mainland side but none will need to be cleared on Curtis Island. The bridge's EMP sets out mitigation measures to be implemented to protect mangroves and water quality.
Maintenance of World Heritage values associated with the area's outstanding coastal landscape values including its scientific value as an indicator of past geomorphological processes and its scenic amenity values.	The project's impacts on World Heritage values and proposed mitigation measures are provided in Section 8.4.
Monitoring of water quality to detect any adverse impacts on marine and estuarine biodiversity from contaminants including suspended solids.	The GLNG project will implement an ongoing water quality monitoring program to ensure the marine and estuarine environments are protected.

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Aspect	GLNG Project Compliance
Future use of the following State land on the coast protects coastal resources and values through the implementation of an appropriate management regime: 29DS546, 1USL36622, 3USL39057 and 2AP8707 (as shown in Figure 8.11.4).	Any development associated with State land will be protected through appropriate environmental management regimes.

The Curtis Coastal Plan contains regional policies and sub-policies to assist in implementing the coastal management outcomes, principles and policies of the State Coastal Plan. These policies and sub-policies have been considered in the project's design where relevant. Regional policies and sub-policies relevant to the project are outlined in Table 7.11.10.

### 8.11.5.10 Impacts on Local Government Planning Schemes

#### Calliope Planning Scheme

Applications for material change of use (planning) in the GSDA are assessed under the provisions of the GSDA Development Scheme rather than the Calliope Planning Scheme. Nevertheless, key elements of the Calliope planning scheme relating to the LNG facility site have been considered below:

- The site is located within the Calliope Rural Locality and included within the Rural Zone. The strategic framework describes the site as rural. Outcomes for this area relate to protecting the rural values of the area. The scheme also recognises potential for industrial development – “*protect the operational and expansion requirements of major industrial facilities within the Major Industry Zone and adjacent to the Gladstone State Development Zone or within Strategic Port Land from the intrusion of inappropriate development*” (Calliope Planning Scheme, Part 6, 2007).
- The site is located close to the 8 km Airport Buffer Area and is outside of the height restriction contours for the existing airport. For the proposed airport facility on Kangaroo Island, the site is beyond the 8 km buffer. Development of the site will require consideration of the Airport Facilities Overlay Code within the planning scheme. Details of the project in relation to Gladstone Airport's operational airspace are discussed in Section 8.8.
- The site is predominantly classified as having a medium bushfire hazard (Bushfire Management Overlay – Series O3, 2006). The bushfire hazard code within the planning scheme discusses requirements for mitigating fire risk. Mitigation and management measures to be implemented to minimise the risk and impact of fires from the facility's construction and operation are provided in Section 13.
- A coastal wetland area and 100 m buffer zone are shown within and adjacent to the site (Coastal Management and Biodiversity Overlay – Series O4A). The planning scheme's coastal management and biodiversity code sets outcomes for coastal management.
- Part of the site is located between 5 m AHD and 20 m AHD (Acid Sulfate Soils Overlay – Series O8, 2008). The ASS code applies to these areas and establishes outcomes for managing ASS based on SPP 2/02. Details of how ASS impacts will be managed on the site are discussed in Section 8.3 of the EIS.
- Part of the site has land with slopes greater than 15 % (Series 9). The code for development on steep land sets out special building requirements based on SPP 1/03.

All development under the IP Act other than for material change of use (planning) in the GSDA is assessed under the IP Act.

Any project component outside of the GSDA requiring planning approval will be assessed under the local authority's planning scheme and the IP Act.

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Relevant applications will be submitted following completion of the EIS process.

### *Gladstone City Planning Scheme*

Possible project components that could be located in Gladstone are defined under the scheme as follows:

- Workers accommodation – “Caravan and relocatable home park” or “Workers Accommodation (Residential Temporary)”;
- MOF during construction - “Port Facilities” (Transport and Storage); and
- Workers car park- “Car Park” (Business)”.

Once the size and location of any necessary facilities are finalised, development applications will be made to the Gladstone Regional Council in accordance with the relevant provisions of the planning schemes. These will be submitted following completion of the EIS process.

#### **8.11.5.11 Impacts on GSDA Development Scheme**

As stated in Section 8.11.3.4, the GLNG LNG facility is consistent with the purposes of the Curtis Island Industry Precinct of the GSDA development scheme. This purpose is to provide for the establishment of LNG facilities and related infrastructure.

For the Curtis Island Industry Precinct, the proposed LNG facility is considered by the GSDA development scheme to be a use that is considered highly likely to meet the purpose of precinct. Schedule 7 of the development scheme states that “high impact industry limited to natural gas (liquefaction and storage)” is a land use designation that is highly likely to meet the precinct’s purpose.

Four policies dealing with specific development issues have been prepared to support the GSDA development scheme, and are outlined in Section 7.11.5.9.

Santos will adopt the goals, standards and guidelines for environmental management under the GSDA development scheme. The environmental management strategies to be implemented for the LNG facility component of the project are outlined in Section 13.

As discussed in Section 3.8.2.7, it is proposed that the construction workforce will be accommodated in an accommodation facility to be established on the LNG facility site on Curtis Island. The accommodation facility will be required for construction activities, other than for the dredge material placement facility. The accommodation facility will be completely self-contained. Workers will be restricted to the project site whilst on the island and will be ferried back to the mainland when they are off roster. Initially, Train 1 will be constructed and subsequent trains will be constructed sequentially over a number of years. The accommodation facility will be required to house the workers during the various construction periods. It will be a temporary use and at completion of construction will be removed.

During the operations phase, short term accommodation will be provided on site for plant upgrades and maintenance programs. Limited emergency accommodation will also be available on site for the operations workforce in the event that weather conditions temporarily prevent transfers from Curtis Island.

The development of the accommodation and associated facilities on Curtis Island are considered by Santos to be an ancillary use (as that term is used in the definition of “use” in the GSDA development scheme) to the development of the LNG facility. The construction and operation of the CAF will ultimately be subject to approval of Santos’ principal material change of use (planning) application by the Coordinator-General under the GSDA development scheme and the CAF and associated facilities falling within the definition of an ancillary use. Such use would form part of the planning application to be made to the Coordinator-General under the GSDA development scheme. The development of the accommodation facility is not an independent use but subordinate to the LNG facility. The Curtis Island Industry Precinct provides for the establishment of liquefied natural gas facilities of national, state or regional significance and further provides for the establishment of infrastructure associated with liquefied natural gas facilities. The accommodation facility is a compatible use and is necessary for the development of the LNG facility. There are good safety and socio-economic reasons to establish the

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accommodation facility on Curtis Island as opposed to the daily ferrying of large numbers of the workforce that will be needed for the construction activities to and from the mainland (refer to Section 2.3.7 for a further discussion on the benefits of locating such a facility on Curtis Island). Any other approvals needed for the accommodation facility will be obtained prior to the occupation and use of the accommodation facility.

### 8.11.5.12 Impacts of Gladstone Port Authority Land Use Plan

The LNG facility development is consistent with the intentions of the GPCs *Land Use Plan 1999* and the updated (2008) 50 year strategic plan, as discussed in Section 8.11.5.9.

### 8.11.6 Cumulative Impacts

Including the GLNG project there are a number of industrial facilities that are proposed for Curtis Island (as described in Section 1.7). There is limited information available as to the planned development of these proposed projects or the scale and timing of their development. However, a qualitative assessment can be made of the possible cumulative impacts.

Should all of the proposed projects be developed, the south-west corner of the island will change from a rural use to a major industrial and port area supporting LNG plants and associated infrastructure and services. Concentrating this development in the one location will facilitate the provision of public infrastructure such as access roads, shipping access, power etc.

The concentration of industry on the south west corner of Curtis Island is recognised to be in the GSDA as a desirable and appropriate planning outcome. Furthermore, this additional development is consistent with the GSDA development plan or is expected to be managed in such a manner as to achieve the objectives of the GSDA development plan.

The LNG facility development is not expected to lead to future non-industrial development on Curtis Island. The development of non-industrial projects is contrary to the objectives of the GSDA development plan. It is proposed that the bridge will have no public access and will provide access to only the industrial and port developments in the GSDA's Curtis Island Industry Precinct. Any associated infrastructure will also be limited to that precinct. Public road access to other parts of the island is not envisaged.

Table 8.11.8 provides a summary of the potential land use impacts and mitigation measures for the LNG facility.



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Table 8.11.8 Summary of Potential Land Use Impacts and Mitigation Measures

Aspect	Potential Impact	Mitigation Measures	Objective
<b>Construction</b>			
Accommodation of construction workforce	Disturbance to residents and overuse of services and infrastructure in South End.	<ul style="list-style-type: none"> <li>Worker access to areas on Curtis Island outside of the designated construction site will be restricted.</li> <li>Construction workforce will be prohibited from visiting South End.</li> <li>Construction workforce will be restricted to the project site whilst on the island and will be ferried back to the mainland when they are off roster.</li> <li>Construction of a project specific MOF adjacent to the facility site to ensure that there will be no disruption to South End residents from the transfer of workforce personnel, plant and equipment.</li> </ul>	Minimisation of disturbance to residents in South End.
Bridge construction	Risk to safety of persons involved in fishing and recreational boating activities.	<ul style="list-style-type: none"> <li>Limitations will be placed on recreational traffic around areas of construction activity.</li> </ul>	To minimise impact on persons involved in fishing and recreational boating activities.
Regional Planning Framework	Non-alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.	<ul style="list-style-type: none"> <li>Measures will be implemented to minimise disturbance outside of the development footprint.</li> <li>The project will minimise the area of disturbance and will implement appropriate mitigation strategies where possible.</li> <li>Recreation and tourism will not be affected beyond the project's site boundaries.</li> <li>EMP will be implemented to control fire and pest species.</li> <li>The site will be cleared in manner that will minimise erosion potential and downstream water quality impacts.</li> <li>The project will minimise the area of disturbance and will implement appropriate mitigation measures to</li> </ul>	Alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.

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Aspect	Potential Impact	Mitigation Measures	Objective
		<p>reduce disturbance to mangrove areas caused by the construction of the PLF and MOF.</p> <ul style="list-style-type: none"> <li>• Santos will participate in the Port Curtis Integrated Monitoring Program and other relevant regional monitoring programs.</li> <li>• Mitigation measures will be implemented to minimise the impacts that have been identified on the area's coastal resources.</li> <li>• EMPs will be implemented to minimise impacts on the coastal marine environment during construction of the proposed bridge and pipeline crossing of Port Curtis.</li> <li>• The bridge has been located to minimise the need to clear mangroves. The bridge's EMP sets out mitigation measures to be implemented to protect mangroves and water quality.</li> <li>• The GLNG Project will implement an ongoing water quality monitoring program to ensure the marine and estuarine environments are protected.</li> <li>• Any development associated with State land will be protected through appropriate environmental management regimes.</li> </ul>	
	<p>Non-alignment with Central Queensland Regional Growth Management Strategy (Natural Resource Management).</p>	<ul style="list-style-type: none"> <li>• The LNG facility will be consistent with the government's declared land use plan for the site as expressed through the GSDA Development Plan.</li> <li>• EMP will be implemented to address threat of pests and diseases.</li> <li>• Santos is proposing to minimise its demands on the region's water supply system by using desalination to supply the facility with water. The facility will be designed to maximise water use efficiency.</li> <li>• The predicted cumulative air quality impacts of the LNG facility will be within acceptable guidelines.</li> </ul>	<p>Alignment with Central Queensland Regional Growth Management Strategy.</p>

## Section 8

## LNG Facility Environmental Values and Management of Impacts

Aspect	Potential Impact	Mitigation Measures	Objective
		<ul style="list-style-type: none"> <li>LNG is an energy source with significantly lower GHG emissions than other hydrocarbon energy sources.</li> <li>The south-west coastline of Curtis Island has been designated in the GSDA Development Plan as an area suitable for LNG development.</li> </ul>	
	Non-alignment with Central Queensland Regional Growth Management Strategy (Economic Development).	<ul style="list-style-type: none"> <li>The GLNG Project will form the basis of an emerging LNG industry in the Gladstone Region.</li> <li>The GLNG facility will have a significant boost to the local, state and national economies.</li> <li>The project will introduce additional skilled workers into the region.</li> <li>The LNG produced by the facility will be exported to international markets.</li> <li>The LNG facility will enable the development of a significant resource to meet the growing demand for lower carbon energy.</li> </ul>	Alignment with Central Queensland Regional Growth Management Strategy.
State Planning Policies	Non-alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.	<ul style="list-style-type: none"> <li>The design elevation of the LNG facility site is sufficient to protect it from regional flooding.</li> <li>The site's stormwater drainage system will be designed to ensure that local flooding does not occur</li> <li>The LNG facility will be designed to cope with the potential impacts of a bushfire.</li> <li>Mitigation and management measures to be implemented to minimise the risk and impact of fires.</li> <li>Earthworks associated with the site's development will level much of the site so that there will be no slopes greater than 15 % around the LNG facility.</li> <li>All slopes remaining on the site will be engineered to ensure they are stable</li> </ul>	Alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.

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## LNG Facility Environmental Values and Management of Impacts

Aspect	Potential Impact	Mitigation Measures	Objective
Local Development Plan	Non-alignment with Gladstone State Development Area Development Plan.	<ul style="list-style-type: none"> <li>Santos will adopt the goals, standards and guidelines for environmental management under the GSDA development scheme.</li> </ul>	Alignment with Gladstone State Development Area Development Plan.
Local Planning Schemes	Non-alignment with Gladstone City Planning Scheme.	<ul style="list-style-type: none"> <li>Once the size and location of any necessary facilities are finalised, development applications will be made to the Gladstone Regional Council in accordance with the relevant provisions of the planning schemes. These will be submitted following completion of the EIS process.</li> </ul>	Alignment with Gladstone City Planning Scheme.
<b>Operation</b>			
Access to LNG facility	Disturbance to residents in South End.	<ul style="list-style-type: none"> <li>Should it be built, the access road linking the bridge to the plant site will be limited to project vehicles only, with public access prohibited.</li> </ul>	Minimisation of disturbance to residents in South End.
Loading of ships at LNG facility	Risk to safety of persons involved in fishing and recreational boating activities.	<ul style="list-style-type: none"> <li>Implementation of an exclusion zone (approximately 200 m radius) around the loading facility even when ships are not loading.</li> <li>There will be no public access to the site and the intertidal areas along the site's frontage to Port Curtis.</li> </ul>	To minimise impact on persons involved in fishing and recreational boating activities.
Bridge	Restrictions on sailing vessel movements.	<ul style="list-style-type: none"> <li>The conceptual design of the proposed bridge allows for the movement of recreational vessels between Port Curtis and The Narrows.</li> </ul>	To minimise impact on recreational sailing activities.
Modification of access routes to LNG facility	Overuse of existing access routes and risks to safety of existing users from LNG plant operations.	<ul style="list-style-type: none"> <li>Existing access tracks around and off the site will be closed for use by Santos workers.</li> <li>Existing tracks that pass through the site will be closed to non-project personnel.</li> </ul>	To ensure access routes are not overused and to ensure safety of access route users.
Fire Management	LNG facility fire involving pressurised hydrocarbon storage tanks.	<ul style="list-style-type: none"> <li>Ground level contours to drain dense flammable gases away from hydrocarbon storage tanks.</li> <li>Fire protection over pressurised hydrocarbon storage tanks.</li> </ul>	Prevention of fire.

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## LNG Facility Environmental Values and Management of Impacts

Aspect	Potential Impact	Mitigation Measures	Objective
		<ul style="list-style-type: none"> <li>Site will have site specific emergency response plan.</li> </ul>	
	Uncontrolled release of product on jetty.	<ul style="list-style-type: none"> <li>Quality assurance of installed equipment.</li> <li>Inspection and condition monitoring program.</li> <li>Port control and berthing procedures.</li> <li>Design standards for potential earthquake and sea surge loads.</li> <li>Electrical equipment rating in accordance with hazardous zones.</li> <li>Emergency shut-down system with remote isolation of storage vessels.</li> <li>Emergency response procedures.</li> </ul>	Prevention of fire.
	Fire in process plant.	<ul style="list-style-type: none"> <li>Hot work procedure.</li> <li>Installation of electrical equipment to electrical standards.</li> <li>Fire separation of critical equipment.</li> <li>Condition monitoring of switch gear and transformers.</li> <li>Fire detection in switch rooms.</li> <li>Fire protection in switch rooms and over transformers.</li> <li>Fire walls shielding critical equipment from transformers.</li> <li>Secondary containment of equipment with liquid combustible materials.</li> </ul>	Prevention of fire.
	Gas explosion during maintenance.	<ul style="list-style-type: none"> <li>Confined space procedure.</li> <li>Hot work procedure.</li> </ul>	Prevention of gas explosion.
Regional Planning Framework	Non-alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.

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## LNG Facility Environmental Values and Management of Impacts

Aspect	Potential Impact	Mitigation Measures	Objective
	Non-alignment with Central Queensland Regional Growth Management Strategy (Natural Resource Management).	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Central Queensland Regional Growth Management Strategy (Natural Resource Management).
	Non-alignment with Central Queensland Regional Growth Management Strategy (Economic Development).	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Central Queensland Regional Growth Management Strategy (Economic Development).
State Planning Policies	Non-alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.
Local Development Plan	Non-alignment with Gladstone State Development Area Development Plan.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Gladstone State Development Area Development Plan.
Local Planning Schemes	Non-alignment with Gladstone City Planning Scheme.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Gladstone City Planning Scheme.
<b>Decommissioning and Rehabilitation</b>			
Accommodation of workforce during decommissioning	Disturbance to residents and overuse of services and infrastructure in South End.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Minimisation of disturbance to residents in South End and to ensure services and infrastructure are not overused by decommissioning activities.
Fire Management	Gas explosion during decommissioning.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Prevention of gas explosion.
Regional Planning Framework	Non-alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment of objectives of the GLNG project to Curtis Coast Regional Coastal Management Plan.

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## LNG Facility Environmental Values and Management of Impacts

Aspect	Potential Impact	Mitigation Measures	Objective
	Non-alignment with Central Queensland Regional Growth Management Strategy (Natural Resource Management).	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Central Queensland Regional Growth Management Strategy (Natural Resource Management).
	Non-alignment with Central Queensland Regional Growth Management Strategy (Economic Development).	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Central Queensland Regional Growth Management Strategy (Economic Development).
State Planning Policies	Non-alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with State Planning Policies for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.
Local Development Plan	Non-alignment with Gladstone State Development Area Development Plan.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Gladstone State Development Area Development Plan.
Local Planning Schemes	Non-alignment with Gladstone City Planning Scheme.	<ul style="list-style-type: none"> <li>Refer to construction section above.</li> </ul>	Alignment with Gladstone City Planning Scheme.

**Section 8****LNG Facility Environmental Values and Management of Impacts****8.11.7 Summary of Findings**

Development of the LNG facility at the proposed site is consistent with the strategic planning intent of both the Queensland Government (through the provisions of the GSDA Development Plan) and the Gladstone Ports Corporation (through its 50 year strategic plan).

The nearest residential area to the LNG facility on Curtis Island is South End which is 8.5 km to the east. The nearest residents on the mainland are 6.5 km away. At these distances there will be no significant noise or dust impacts to residents due to construction activities. The LNG facility will not be visible from South End apart from the flare stack which, at 8.5 km distance, will be barely visible. The stack and the LNG storage tanks will be visible from Gladstone. The facility will emit light at night, similar to other industrial facilities in Gladstone.

Accommodation for the construction workforce will be provided on Curtis Island adjacent to the project site. The accommodation facility will be completely self-contained. Workers will be restricted to the project site whilst on the island and will be ferried back to the mainland when they are off roster.

A MOF will be constructed adjacent to the LNG facility site to ensure that there will be no disruption to South End residents from the transfer of workforce personnel, plant and equipment to the site.

For safety reasons fishing and recreational boating activities will be prohibited around the PLF during the loading of ships. There will also be an exclusion zone around the loading facility even when ships are not loading. An exclusion zone of approximately 200 m radius will apply.

The Curtis Coast Regional Management plan identifies Curtis Island as a significant coastal resource and seeks for protection of the area's integrity and ecological functioning from incompatible land use and activities. The LNG facility and associated development (PLF, MOF, potential bridge etc.) have been located and designed to minimise disturbance to ecological functioning and environmental values of the area.

Cattle grazing on the site will cease prior to the construction of the LNG facility commencing. The site will be fenced and the surrounding land which is also used for grazing will not be affected by the project. The land is not considered to be GQAL.