

30. LAND USE AND PLANNING

This chapter describes the consistency of the project with the long term policy framework for the study area. The land use values of the study area, the impact of the project on these values, and the strategies Arrow Energy will implement as part of the project to protect land use values are also discussed.

A land use and planning impact assessment for the Arrow LNG Plant EIS was undertaken by Coffey Environments (Appendix 28, Land Use and Planning Technical Report).

The objective for land use and planning is set out in Box 30.1.

Box 30.1 Objectives: Land use and planning

- To minimise land use conflicts with other existing and proposed human land use activities.

30.1 Legislative Context and Standards

The following sections identify Commonwealth and state legislation and state and regional policies and plans relevant to land use and planning within the study area. Further detail is contained in Attachment 1, Relevant Legislation, Policies and Development Approvals.

30.1.1 Commonwealth and Queensland Legislation

The following Commonwealth legislation is relevant to land use and planning within the study area:

- *Environment Protection and Biodiversity Conservation Act 1999*. This act protects matters of national environmental significance, including nationally and internationally important flora, fauna, ecological communities and heritage places. Species listed under international treaties are protected by this act.
- *Great Barrier Reef Marine Park Act 1975*. This act provides for the protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef region. The act requires LNG shipping and other project-related maritime transport activities to use designated shipping channels when passing through the Great Barrier Reef region.
- *Native Title Act 1993*. This act provides for the recognition and protection of native title rights and interests of Indigenous Australians. The act establishes processes to determine where native title exists and how future activities potentially impacting native title may be undertaken, and provides compensation where native title rights are impaired or extinguished.

The following Queensland legislation is relevant to land use and planning within the study area:

- *State Development and Public Works Organisation Act 1971 (SDPWO Act)*. This act establishes the office of the Coordinator-General, and grants the Coordinator-General significant powers to direct programs of work, manage major projects and coordinate environmental impact assessments on a whole-of-government basis. The Development Scheme for the Gladstone State Development Area (GSDA) and the Port of Gladstone Western Basin Master Plan were prepared under this act.

- *Petroleum and Gas (Production and Safety) Act 2004 (P&G Act)*. This act, administered by the Department of Employment, Economic Development and Innovation (DEEDI), facilitates the development of a safe, efficient and viable petroleum industry in Queensland. Licences are required under the act to construct and operate the LNG plant and feed gas pipeline.
- *Sustainable Planning Act 2009*. As Queensland's principal planning legislation, the act coordinates planning at local, regional and state levels. The act requires all regional governments to have a planning scheme in place to manage and regulate development. The act provides a common assessment framework in the form of the Integrated Development Assessment System (IDAS) for regional councils and state government agencies to assess development applications against specific regional planning schemes or other plans, as applicable. The act also enables the planning minister to make state planning policies to advance the purpose of the act. Where an EIS process has been completed under the SDPWO Act for a material change of use of land, the SDPWO Act process substitutes the information and referral stage and the notification stage of the IDAS process. IDAS provisions do not apply to petroleum activities governed by the P&G Act, or to a material change of use of land located in the Gladstone State Development Area.
- *Environmental Protection Act 1994*. This act provides for the protection of Queensland's environment by promoting ecologically sustainable development. The act gives the environment minister the power to create environmental protection policies. The Environmental Protection Regulation 2008 identifies 'environmentally relevant activities' for which an environmental authority under the act is required. Generally, applications to undertake environmentally relevant activities (excluding petroleum activities) are assessed under the IDAS process.
- *Transport Infrastructure Act 1994*. This act grants Queensland port authorities powers to establish, manage and efficiently and effectively operate port facilities and services. Port authorities must prepare land-use plans that identify strategic port land, including desired environmental outcomes for the land and proposed measures to achieve desired environmental outcomes. Land-use plans provide the statutory framework for assessing development on strategic port land in accordance with the Sustainable Planning Act and IDAS. Gladstone Ports Corporation is the port authority for the study area, and the assessment manager for assessable development under the Sustainable Planning Act and IDAS on strategic port land and within strategic port land tidal areas.
- *Coastal Protection and Management Act 1995*. This act provides for the protection and management of the coastal zone having regard to the guiding principles of the National Strategy for Ecologically Sustainable Development (ESDSC, 1992). The act requires the minister to prepare a coastal management plan to describe how the coastal zone will be managed. The act also allows coastal management districts to be established, for which special development controls for operational works under the IDAS process apply, e.g., tidal works and disposal of dredge spoil. The study area lies within the Curtis Coast Coastal Management District.

30.1.2 Planning and Statutory Guidelines

The following planning and statutory guidelines are relevant to land use and planning in the study area:

- National Strategy for Ecologically Sustainable Development (ESDSC, 1992). This strategy sets out the broad strategic direction and framework to inform policy and decision making in relation

to development in Australia. The strategy informs a coordinated approach by Australian, state/territory and local governments on environmental matters.

- Planning schemes for the Gladstone Regional Council. On 15 March 2008, the Calliope Shire Council, Gladstone City Council and Miriam Vale Shire Council amalgamated to form the Gladstone Regional Council. The Gladstone Regional Council is developing a regional planning scheme. The planning schemes of the former local governments continue to apply to their respective areas until such time as a regional scheme is finalised. The study area is covered by two local government planning schemes:
 - Calliope Shire Planning Scheme (CSC, 2007b).
 - Gladstone Plan (SKM, 2006).

These schemes manage growth and regulate development. Both planning schemes contain desired environmental outcomes, localities and locality codes, overlay codes, assessment criteria and zoning maps expressing forward planning intent, infrastructure charges schedules and other schedules and planning scheme policies.

- Development scheme for the Gladstone State Development Area (DIP, 2010c). This scheme replaces provisions of the Calliope Shire Planning Scheme and the Gladstone Plan to regulate development within the GSDA. The area is divided into precincts and subprecincts considered suitable for industrial development of national, state and regional significance, as well as complementary industrial, infrastructure and services uses. The development scheme sets out the land use approval process for a material change of use of premises in the GSDA.
- Port of Gladstone 50-year Strategic Plan (GPC, 2008). This plan identifies the potential for the future development of port centres and ensures the ability of the port to accommodate the anticipated expansion of Gladstone's industry in a sustainable manner. The plan is not a statutory document but provides useful background material and strategic direction.
- Port of Gladstone Land Use Plan 1999 (GPA, 1999). This plan is the current land use plan for the port approved under the Transport Infrastructure Act. The plan provides direction for strategic port land use and planning and is used by the Gladstone Ports Corporation in its role as assessment manager for assessable development on strategic port land under the Sustainable Planning Act and IDAS.
- Port of Gladstone Draft Land Use Plan 2010 (GPC, 2010). This plan will replace the Land Use Plan (GPA, 1999) when approved under the Transport Infrastructure Act. The plan divides Gladstone Ports Corporation land holdings into 11 individual port-planning localities. Land within each locality is allocated to one of nine land use precincts. Environmental and community outcomes and indicative consistent land uses are described in the draft plan for each locality.
- Port of Gladstone Western Basin Master Plan (DIP, 2010a). This plan has been prepared under the SDPWO Act and gives direction to current and planned land and marine uses, infrastructure development, port activities, common-user channels, and dredging and disposal options in the Western Basin to 2039. The master plan identifies Kangaroo Island and an area to the east of Balaclava Island in Port Alma as areas that may be set aside to address environmental offset mitigation obligations of Western Basin projects.
- State Coastal Management Plan (DERM, 2002a). This plan is the current approved coastal management plan for Queensland under the Coastal Protection and Management Act. The

plan is expected to be replaced by the Queensland Coastal Plan (DERM, 2011a) from mid-2011.

- Queensland Coastal Plan (DERM, 2011a). This plan comprises two policies; the State Policy for Coastal Management, and the State Planning Policy 3/11: Coastal Protection. The former policy applies to development not assessable under the Sustainable Planning Act, while the latter relates to assessable developments.
- Curtis Coast Regional Coastal Management Plan (EPA, 2003). This plan, which applies to the study area, is one of four regional coastal management plans currently in force to implement the State Coastal Management Plan at a regional level. The plan contains regional policies and identifies key coastal sites and coastal localities with identified special coastal management needs. Curtis Island and Gladstone Harbour are included in these localities. The regional plan will also be superseded when the Queensland Coastal Plan comes into effect. The Queensland Coastal Plan encourages the development of local area plans of management.
- Gladstone Region Community Plan (GRC, 2011a). This plan is the long-term community plan prepared by Gladstone Regional Council in accordance with the *Local Government Act 2009* (Qld). The plan aligns a number of existing regional plans and studies to provide a detailed vision for the future of the region. Strategies for achieving the vision are described according to the themes of economy, society, environment and governance. The community plan will be considered by Gladstone Regional Council when developing a consolidated regional planning scheme under the Sustainable Planning Act.
- The Central Queensland Regional Growth Management Framework (CQRPAC, 2002). This framework is an existing non-statutory regional plan prepared by the Central Queensland Regional Planning Advisory Committee in partnership with local councils, communities and business and industry representatives under the now repealed *Integrated Planning Act 1997* (Qld) (the predecessor to the Sustainable Planning Act). The framework focuses on six themes:
 - Resource use conservation and management.
 - Economic development.
 - Infrastructure.
 - Social and cultural development.
 - Education, training and research.
 - Planning and governance.

The framework was prepared prior to the commencement of statutory regional plans. While the framework has no legislative power, it remains in force under the Sustainable Planning Act.

- Applicable state planning policies. A number of state planning policies established under the Sustainable Planning Act provide guidance to local authorities, Queensland Government agencies and the Planning and Environment Court when making planning decisions and carrying out planning functions. These policies include:
 - SPP 1/92: Development and the Conservation of Agricultural Land.
 - SPP 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities.
 - SPP 2/02: Planning and Managing Development involving Acid Sulfate Soils.
 - SPP 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.

- SPP 1/07: Housing and Residential Development including Guideline.
- SPP 2/07: Protection of Extractive Resources and Guideline.
- SPP 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments.

30.2 Assessment Method

The study area discussed in relation to land use is shown on Figure 1.2. Plans and policies discussed as part of the study typically extend over the broader Gladstone Regional Council area.

The steps taken to complete the land use and planning assessment included:

- Identifying applicable legislation, policy and planning and statutory guidelines related to land use and planning.
- Identifying existing land uses and land environmental values within the study area via desktop assessment and a general site visit.
- Discussing the consistency of the project against applicable legislation, policy and planning documents.
- Considering project activities and assessing the potential impact of activities on land use environmental values.
- Identifying mitigation measures for issues considered to have potential moderate or high impact. No mitigation measures were proposed for issues with potential low or negligible impacts.
- Assessing the significance of residual impacts, assuming mitigation measures are applied.

The significance of impacts was identified considering the sensitivity of the environmental value and the magnitude of the impact prior to and following the application of mitigation measures. A description of how criteria were applied to the assessment is provided below.

30.2.1 Sensitivity

The sensitivity of an environmental value is determined by its vulnerability to threatening processes or according to its intrinsic value. Five attributes of the value are considered:

- Conservation Status. The conservation status is assigned to an environmental value by governments or recognised international organisations through legislation, regulations and international conventions.
- Intactness. This is the degree to which an environmental value remains intact or representative of its type.
- Uniqueness or Rarity. How abundant an environmental value is within and beyond its reference area (e.g., bioregion/biosphere).
- Resilience to Change. How capable an environmental value is to adapting to change without its conservation status, intactness, uniqueness or rarity being adversely affected.
- Replacement Potential. The potential for a representative or equivalent example of the environmental value to be found to replace any losses.

The criteria for determining high, moderate and low sensitivity for land use environmental values are set out in Table 30.1.

Table 30.1 Criteria for defining land use and planning sensitivity

Sensitivity	Definition
High	- A site designated to have national or international environmental significance (e.g., Great Barrier Reef World Heritage Area, Port Curtis Directory of Important Wetlands listing, areas identified as supporting migratory birds under international migratory bird agreements). - Sensitive receptors including the urban population, dwellings and land uses such as schools, childcare centres and hospitals.
Moderate	- Areas adjacent to or adjoining major infrastructure where incompatible land uses could compromise future development and existing operation of industry (e.g., Curtis Island Industry Precinct for the development of LNG facilities, strategic port land, commercial fishing areas). - Areas identified in the Curtis Coast Regional Coastal Management Plan (EPA, 2003) as having state significance at a regional level (i.e., natural and scenic coastal landscape, the Port of Gladstone). - Open space areas and other areas that contain a mix of uses and ecological, landscape, scenic amenity, recreational or commercial values (i.e., good-quality agricultural land, land containing mineral and petroleum resources, areas enjoyed for bushwalking and boating). - An area potentially suitable as an environmental offset, which is presently not recognised or protected. - A sustainable area of priority habitat, e.g., essential habitat.
Low	- Sites, features and attributes (natural or man-made) or populations not recognised to hold local social, cultural or economic significance. - Land where a proposed alternate land use is consistent with the planning or development scheme for the area.

30.2.2 Magnitude Criteria

The magnitude of impact is an assessment of the geographical extent, duration and severity of the impact as follows:

- Geographical Extent. The spatial extent of the impact where the extent is defined as site, local, regional or widespread (state-wide, national or international).
- Duration. Whether the timescale of the impact is short i.e., medium or long term.
- Severity. The scale or degree of change from the existing condition that results from the impact. This change could be positive or negative.

The criteria for determining magnitude of impact in the land use and planning impact assessment are set out in Table 30.2.

Table 30.2 Criteria for defining land use and planning magnitude of impact

Magnitude of Impact	Description
High	- Impact likely to have large, severe or negative land use impact on the population, community, environmentally sensitive area or an ecosystem's survival and health. - Impact is regional and widespread up to a national scale. - Environmentally sensitive area recovery may be possible but only in the long term.

Table 30.2 Criteria for defining land use and planning magnitude of impact (cont'd)

Magnitude of Impact	Description
Moderate	- Effect on land use will be detectable but not severe. The geographic populations or extent of ecological communities may be reduced but this is unlikely to lead to major land use and planning changes to population, community or ecosystem survival or health. - Impact generally affects the project locality. - Environmentally sensitive area recovery is likely in the medium term through direct intervention and rehabilitation.
Low	- Effect on land use may be detectable but is not likely to be significant. - Impact generally affects the project site and its immediate surrounds. - Environmentally sensitive area recovery in the short term through natural regeneration, regrowth or decolonisation.

30.2.3 Assessment of Significance of Impacts

The significance of impacts is determined by assessing the magnitude of a potential impact on the environmental value having regard to its sensitivity or vulnerability to change. The significance assessment matrix (Table 30.3) shows how, using the criteria described above, significance of impacts has been determined. A description of the significance of an impact derived using Table 30.3 is detailed in Table 30.4.

Table 30.3 Significance of impacts matrix

	Sensitivity of Environmental Value		
Magnitude of Impact	High	Moderate	Low
High	Major	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Negligible

Table 30.4 Significance of impact

Significance of Impact	Description
Major	A major impact occurs when impacts will potentially cause irreversible or widespread harm to an environmental value that is irreplaceable due to its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation.
High	A high impact occurs when activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the environmental value. While replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred in order to preserve its intactness or conservation status.
Moderate	A moderate impact occurs where the environmental value would be further degraded due to the scale of the impacts or its susceptibility to further change. The abundance of the environmental value ensures it is adequately represented in the region and that replacement, if required, is achievable.
Low	A low impact occurs where an environmental value is of local importance, and temporary and transient changes will not adversely affect its viability, provided standard environmental controls are implemented.
Negligible	A degraded (low sensitivity) environmental value exposed to minor changes (low magnitude impact) will not result in any noticeable change in its intrinsic value. Hence activities will have negligible impact. This is typically the case where activities occur in industrial or highly disturbed areas.

30.3 Existing Environment

This section details the existing environment and environmental values of the study area in the context of land use. Ecological, cultural, social and economic factors may all contribute to land use environmental value.

30.3.1 Land Tenure

The majority of the study area, both on the mainland and Curtis Island, comprises freehold land, with several parcels of state forest located on the mainland as shown on Figure 30.1.

High-voltage electricity, gas pipeline, conveyor, railway and state-controlled road infrastructure easements traverse the study area. No stock routes lie within the study area.

30.3.2 Existing Land Use

The existing land use within Curtis Island Industry Precinct and surrounds, city of Gladstone and surrounds, and Port Curtis so far as it relates to the study area, is discussed below.

Curtis Island Industry Precinct and Surrounds

In July 2008, the Queensland Government declared the southwest portion of Curtis Island a precinct of the Gladstone State Development Area. This precinct, identified as the Curtis Island Industry Precinct, was set aside for LNG production and export. The precinct also encompasses strategic port land at Hamilton Point, which may be used to expand port operations.

Evidence remains of use of Curtis Island by Indigenous people in the years prior to European settlement of the Gladstone region. More recently, land use within the Curtis Island Industry Precinct comprised forestry and grazing prior to the commencement of construction of the Santos and Petronas Gladstone Liquefied Natural Gas Project and the QGC and BG Group Queensland Curtis LNG Project in 2011. The public has had access to the island's coast for recreational fishing and boating activities. Limited recreational activities have been allowed on the LNG plant site with landowner permission.

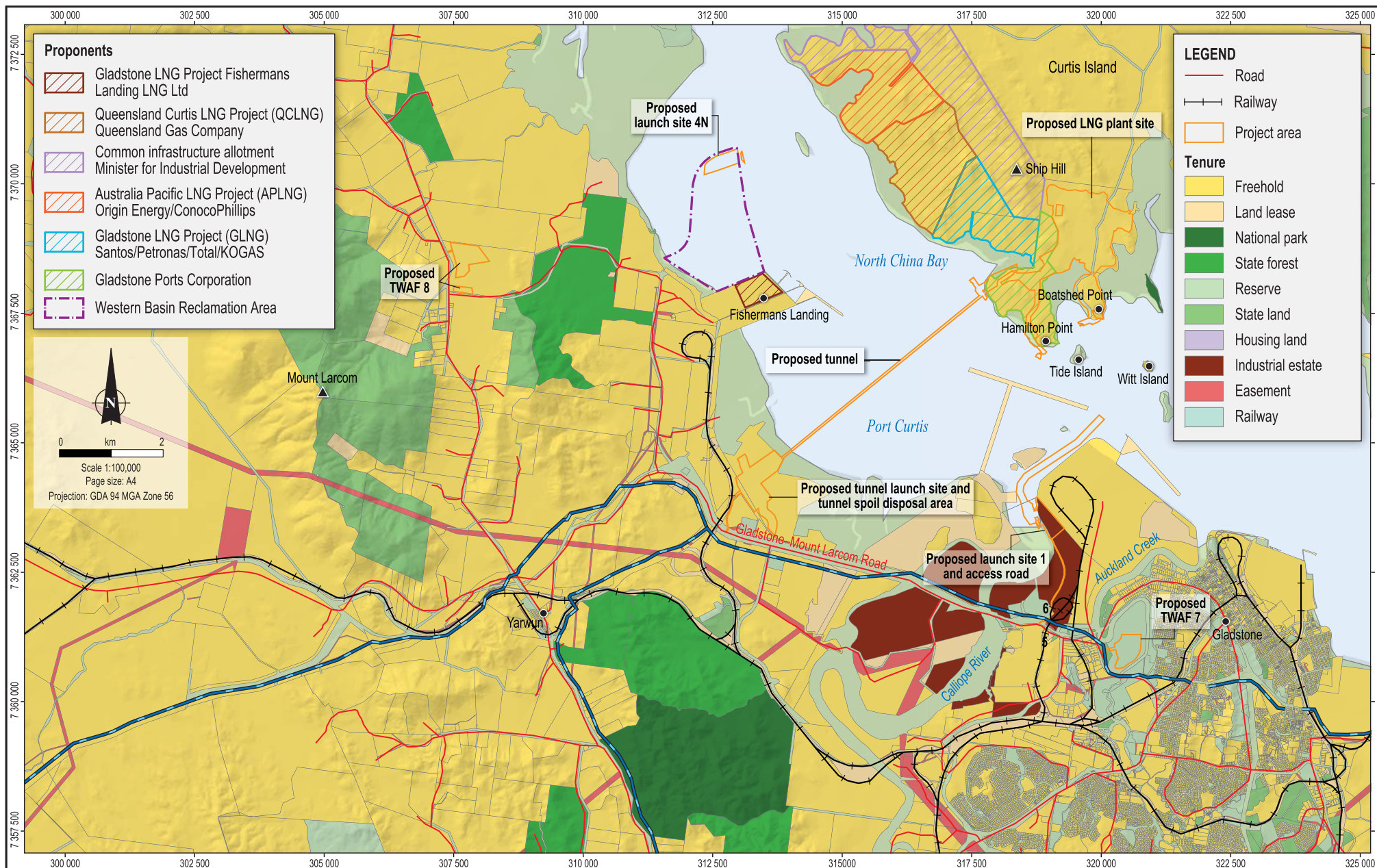
Beyond the industry precinct and outside the study area, the Curtis Island National Park, the Curtis Island Environmental Management Precinct and several reserves have been declared to protect conservation assets on the island. Outdoor recreational activities are encouraged in the national park and reserves.

Environmental values associated with land use in the Curtis Island Industry Precinct and surrounds include:

- Outdoor recreational activities in conservation areas, e.g., bushwalking.
- Indigenous traditional owner cultural resources.
- Biodiversity values including endangered and of concern regional ecosystems and wetlands.
- Approved LNG development within the Curtis Island Industry Precinct.
- Strategic port land development opportunities at Hamilton Point.

Data indicating the agricultural land status of Curtis Island was not available. Registered lots that lie within the study area include:

- Lots 3, 4 and 5 on SP235936.
- Lot 6 on DS220.
- Lot 1 on RP602284.
- Lot 7 on SP239683.



Source:
 Place names and roads from DME.
 Project area, proponents, existing infrastructure and digital elevation model from Coffey Environments.
 Gas pipelines from GEODATA250k.
 Land tenure and cadastre from DERM (07/01/2010).
 Western Basin Reclamation Area from Gladstone Ports Corporation.

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Land tenure and infrastructure

Figure No:
30.1

City of Gladstone and Surrounds

The city of Gladstone local government area had an estimated population of 59,644 at 30 June 2009. The city has a residential core surrounded by major heavy industries and port related developments particularly on the western side of the city.

Gladstone is a major central Queensland hub for materials and metals processing industries. Existing major heavy industry such as Cement Australia, the Stuart Oil Shale Pilot Facility, Rio Tinto's Yarwun Alumina Refinery, the proposed Gladstone Pacific Nickel Refinery and the Wiggins Island Coal Terminal are located within the vicinity of the study area. Environmental impact statement processes have been completed for the Gladstone Pacific Nickel Refinery and Wiggins Island Coal Terminal. Stage one of Wiggins Island Coal Terminal is scheduled for completion by 2012.

An extractive industry key resource area lies to the west of the town of Yarwun, approximately 20 km west of Gladstone. Millable timber may be found within state forests and on private property across the region.

The city of Gladstone and the industrial areas west of the city to Fishermans Landing are classified as Class D non-agricultural land under SPP 1/92 (Figure 30.2). Land west of Fishermans Landing is predominately classified as Class C pasture land, with small pockets of Class A cropland, including some on the TWAF 8 site, although the area is no longer used for agricultural purposes.

Although no private properties will be traversed by pipeline right of way, specific properties that will be impacted by the project include:

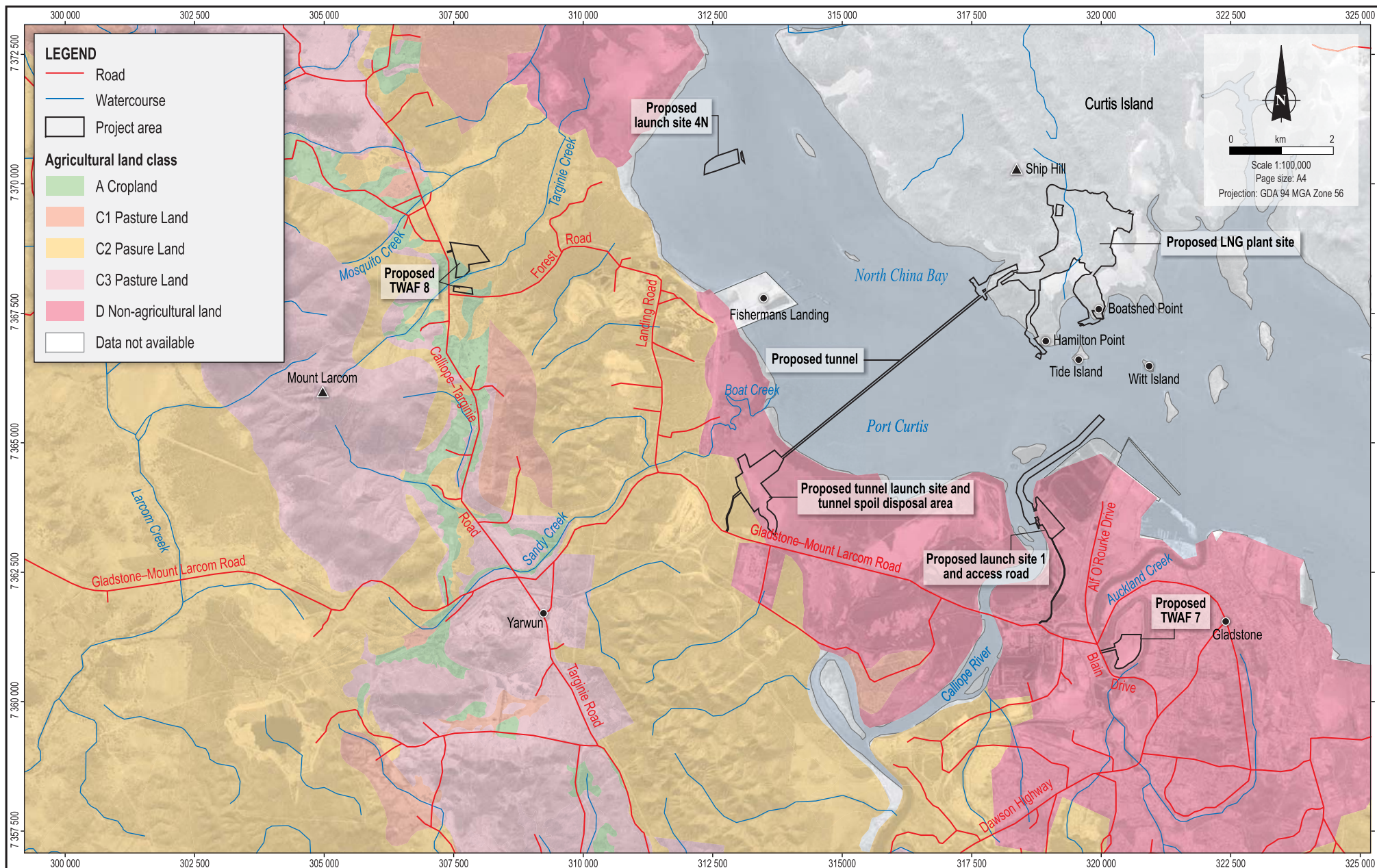
- Tunnel launch site and spoil disposal area (under contract by Arrow Energy) (Lot 1 on SP235026, Lot 3 on SP235026 and Lot 2 on SP147871).
- TWAF 7 site (former Gladstone Power Station ash pond) (Lot 200 on Plan CTN2173 and Lot 32 on Plan USL15325).
- TWAF 8 site (private property) (Lot 200 on Plan CTN2173).
- Launch site 1 (former Gladstone Power Station ash pond) (Part of Lot 69 on Plan P4247).
- Launch site 4N (reclaimed land developed by Gladstone Ports Corporation).

Land environmental values associated with the city of Gladstone and surrounds include:

- Development opportunities associated with the Gladstone State Development Area.
- Existing land uses (rights of infrastructure owners and private property owners).
- Extractive resources (quarry resources) of state or regional significance.
- Millable timber resources.
- Good-quality agricultural land.

Port Curtis

Port Curtis is a natural deep-water harbour that provides for the significant economic activities of the Port of Gladstone. Areas of shoreline along Port Curtis have been designated strategic port land under the Transport Infrastructure Act. Under the Gladstone Ports Corporation draft land-use plan (GPC, 2010b), areas have been divided into 11 port planning localities. These localities are:



Source:
 Place names and roads from DME.
 Agricultural land classes from DERM.
 Project area from Coffey Environments.
 Queensland coastline from GBRMPA.
 Western Basin Reclamation Area from Gladstone Ports Corporation. Imagery from SPOT (2004-2007).

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Agricultural land classes

Figure No:

30.2

- South Trees and Boyne Wharf. Facilities at the South Trees and Boyne Wharf area mostly serve Queensland Alumina Limited and Boyne Smelter Limited. In addition to aluminium industry activities, port facilities also handle bauxite, alumina, petroleum coke, fuel oil, caustic soda and aluminium metal. Throughput at these wharves is expected to increase.
- Port Central. Facilities at Port Central provide cargo handling and container storage, and throughput of general cargo, construction materials, petroleum, LPG and chemicals, grain and minor bulk products. Expansion plans for Port Central include three additional berths for Pamamax vessels, and the use of vacant land to expand the activities of the port, including container handling and the storage and transfer of cargo coming to and from the Gladstone State Development Area.
- Hanson Road Light Industrial Precinct. This locality, which fronts Auckland Creek, provides a buffer area to preserve waterfront land for strategic port purposes.
- East Shores. This locality is predominately open space and contains some community recreation features such as boat ramps, seating and limited commercial activities. The Gladstone Ports Corporation is developing a master plan for the redevelopment of the area, including recreational areas, cafes, a pedestrian promenade and new car parks.
- Gladstone Marina. Facilities at Gladstone Marina include local recreational, educational, tourist and community facilities.
- RG Tanna Coal Terminal. The coal terminal is currently a 4 berth, 21 stockpile facility established on reclaimed land. Future expansion may include additional reclamation to accommodate a proposed alternate tug harbour and further areas for light industrial activity.
- Wiggins Island. The Wiggins Island area is currently vacant and undeveloped but is intended to accommodate an approved coal export terminal, rail infrastructure and supporting infrastructure to service increasing demand for export coal.
- Fishermans Landing. Fishermans Landing comprises three wharves with the following specific port activities:
 - Fishermans Landing Wharf No. 2 sees alumina exported to smelters in Australia and overseas and imports of bauxite and caustic soda.
 - Fishermans Landing Wharf No. 4 facilitates bulk cement clinker, cement and flyash exports.
 - Fishermans Landing Wharf No. 5 is a bulk liquids facility, multi-product wharf, which facilitates the import of liquid ammonia pumped to an adjacent storage tank via pipeline.

The Gladstone Ports Corporation plans to reclaim additional land adjacent to the existing port facility to construct six new wharves and develop an area for transport, storage, loading and unloading facilities.

- Facing Island. This locality was acquired as a reserve to prevent erosion and land degradation from grazing that would adversely affect the navigational channels through Port Curtis. Gladstone Ports Corporation intends to leave this locality in its natural state.
- Curtis Island. Significant coastal wetland and regional ecosystems surround vacant strategic port land located at Hamilton Point. Subject to environmental approval, Hamilton Point is earmarked for a possible common-user port facility (i.e., container or liquid products storage and export facility).

- Port Alma. This locality contains three berths suitable for general cargo. Due to its isolation from built-up areas, Port Alma offers a long term expansion opportunity for the port. Approximately 12,850 ha of this strategic port land will be set aside for environmental offsets associated with Gladstone Ports Corporation projects and other projects in the Western Basin.

The Gladstone Ports Corporation has also initiated the Western Basin Strategic Dredging and Disposal Project. This project involves deepening and widening existing channels and swing basins, and creating new channels, swing basins and berth pockets in the Western Basin. Material dredged is to be placed in the East Banks Sea Disposal Site and the Western Basin Reclamation Area. This area is located to the north and immediately adjacent to the existing Fishermans Landing reclamation area. The Western Basin Reclamation Area will create a land reserve that will be used to service new port facilities being developed at Fishermans Landing.

With the exception of Port Alma, Facing Island and Curtis Island, strategic port land can be seen on Figure 30.6 and 30.7.

Marina facilities also provide access for private, commercial and charter boats to the harbour and Great Barrier Reef region.

Values associated with the Port of Gladstone and the use of Port Curtis include:

- Operations undertaken on strategic port land, e.g., operation of RG Tanna Coal Terminal.
- Other commercial maritime operations including tourism, within the Port of Gladstone.
- Recreational activities associated with the harbour including boating, fishing and sailing.
- Safety at sea (navigation).

30.3.3 Native Title

Native title rights and interests have potential to exist in relation to land and waters in the study area. The Port Curtis Coral Coast native title claim QC01/29 extends over the Arrow LNG Plant site and the portion of the study area located on the mainland (Figure 30.3). The Port Curtis Coral Coast claim extends only to the mean high water mark and not all waters of Port Curtis.

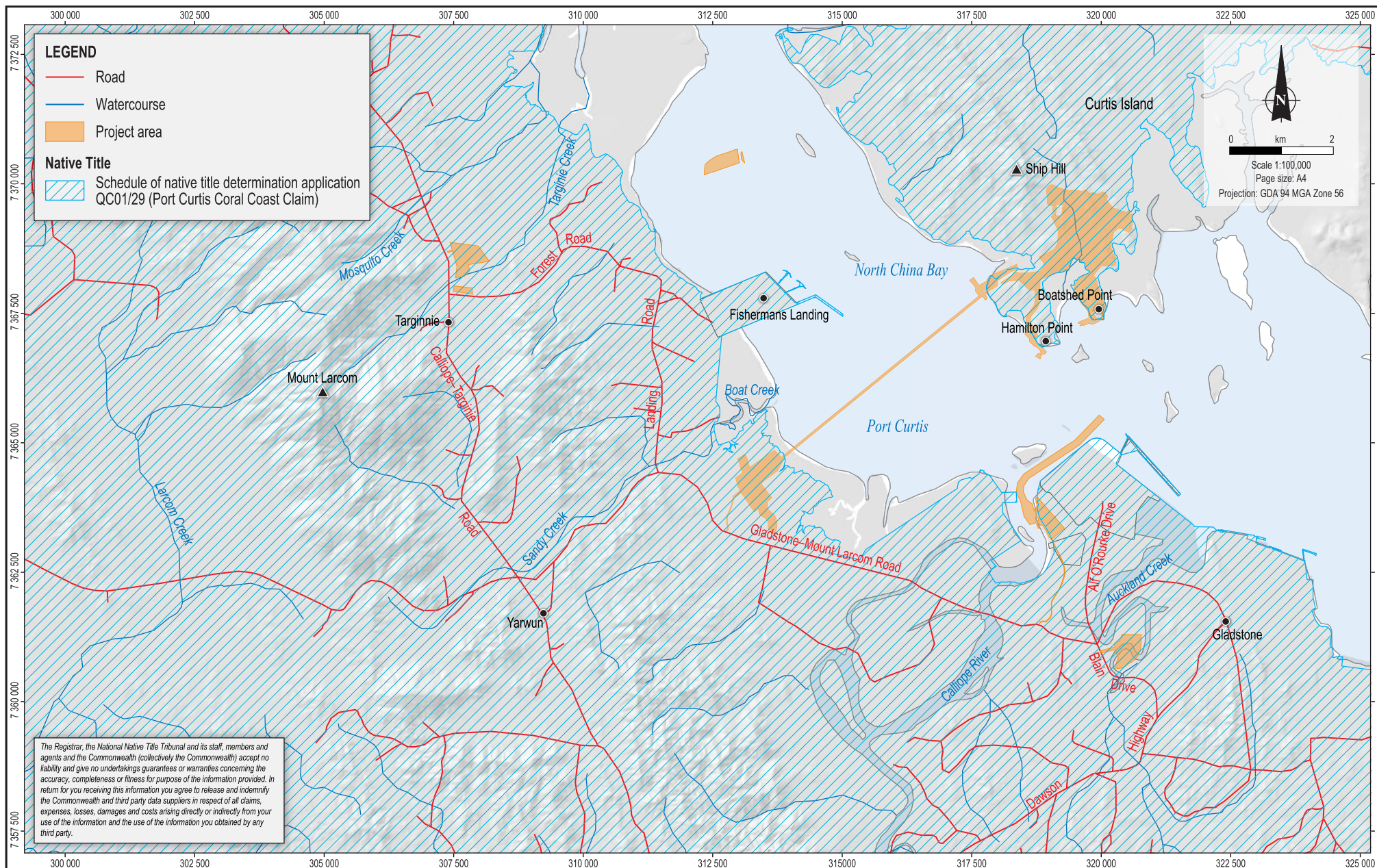
Queensland South Native Title Services is the representative body for the area. The area managed by the representative body is split into five regions. The Port Curtis Coral Coast claim lies within the North West Region.

30.3.4 Extractive Resources, Petroleum and Gas Deposits

Extractive, mining and petroleum tenements within the study area are shown on Figure 30.4. These are:

- Exploration permits for minerals 3215, 4612, 15771 and 18190.
- Mineral development licences 177, 179 and 225.
- Mining leases 3613, 7629 and 80003.
- Petroleum pipeline licences 30, 56, 60, 121 and 144.
- Petroleum facility licences 10, 11, 18 and 20.
- Petroleum survey licences 62, 63, 64, 66, 67, 69 and 71.

Mining tenements are associated with the Stuart Oil Shale resource, which is considered an important mineral resource for the state.



Source:
Place names, roads and watercourses from DME.
Native Title from NNTT - 16.02.2011.
Project area and digital elevation model from Coffey Environments.
Queensland coastline from GBRMPA.

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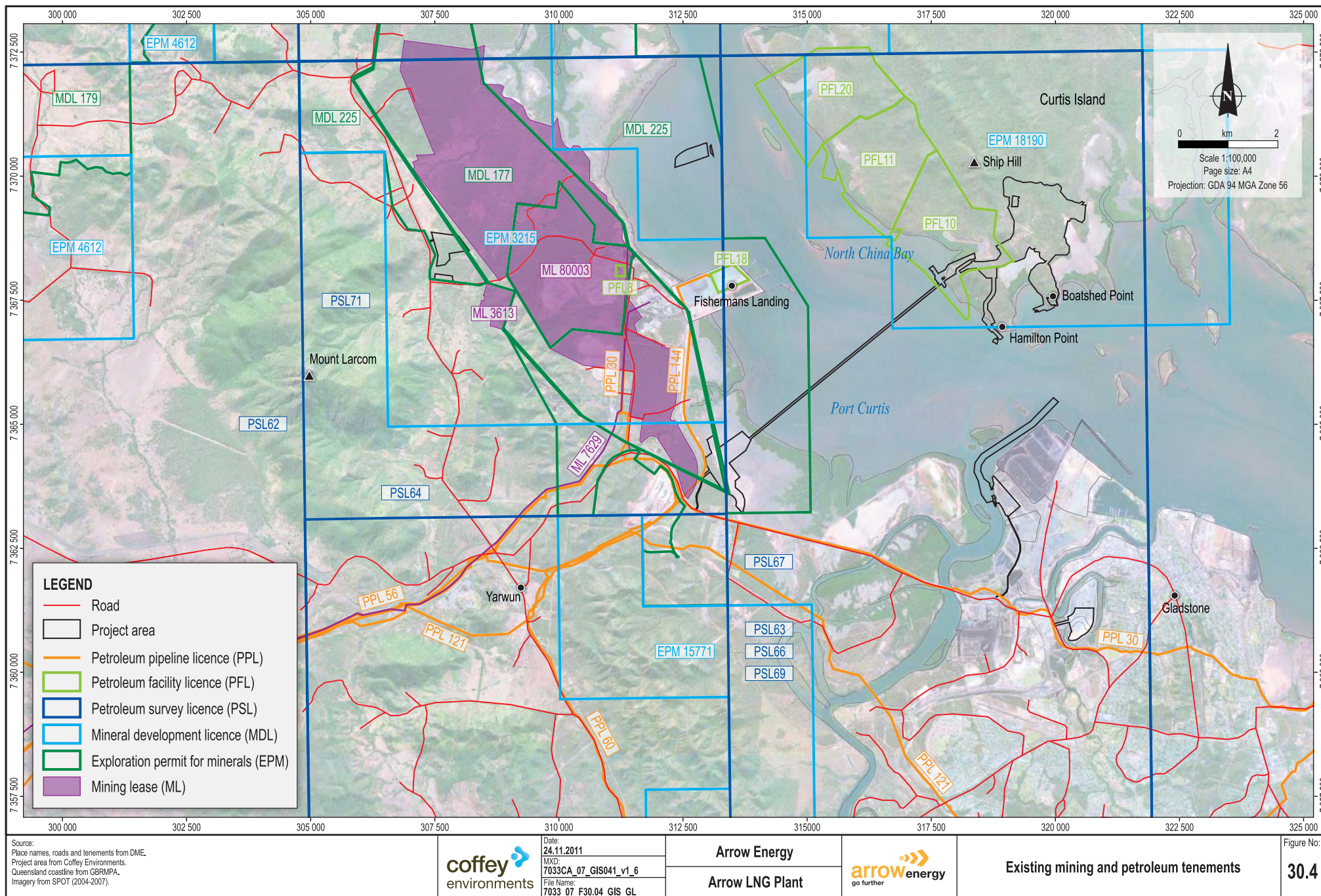
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arrow
go further energy

Native Title

Figure No:
30.3



30.3.5 Infrastructure

Infrastructure located within the study area is shown on Figure 30.1 and Figure 28.2 and includes roads, high-voltage power lines, petroleum pipelines, a raw water sewage reservoir and the Gladstone Water Treatment Plant. The main roads within the study area include Gladstone–Mount Larcom Road, Landing Road, Hanson Road and Blain Drive. A number of bridges are located along Gladstone–Mount Larcom Road.

Key infrastructure in the surrounding area includes the 1,680 MW Gladstone Power Station, Gladstone Area Water Board Water Treatment Plant, Yarwun Sewerage Treatment Plant and the Gladstone Airport.

The city of Gladstone is connected to the intrastate telecommunications network by high-capacity, dense wave division multiplexer, optical fibre transmission systems. The extensive fibre infrastructure makes it relatively straightforward to increase core network capacity for landline telecommunication services to the Gladstone area (where required).

Existing mobile telecommunications infrastructure in the Gladstone area (mobile tower at Targinnie) has a peak capacity of 3 mbits/sec download. Consultation with the local telecommunications provider, Telstra, indicates this is planned to be expanded to 21 mbit/secs. The accessibility and operability of this infrastructure is of social and economic importance to the region.

30.3.6 Residential Areas and Zoning

The study area lies to the west of the residential areas of the city of Gladstone. The area to the east of the proposed temporary workers' accommodation facility (TWAF 7) contains residential housing. Similarly, a number of single detached dwellings (shown as sensitive receptors on Figure 30.5) lie in the vicinity of proposed TWAF 8.

Sensitive receptors are also located on Tide and Witt islands, immediately south and southeast of the Arrow LNG plant site on Curtis Island.

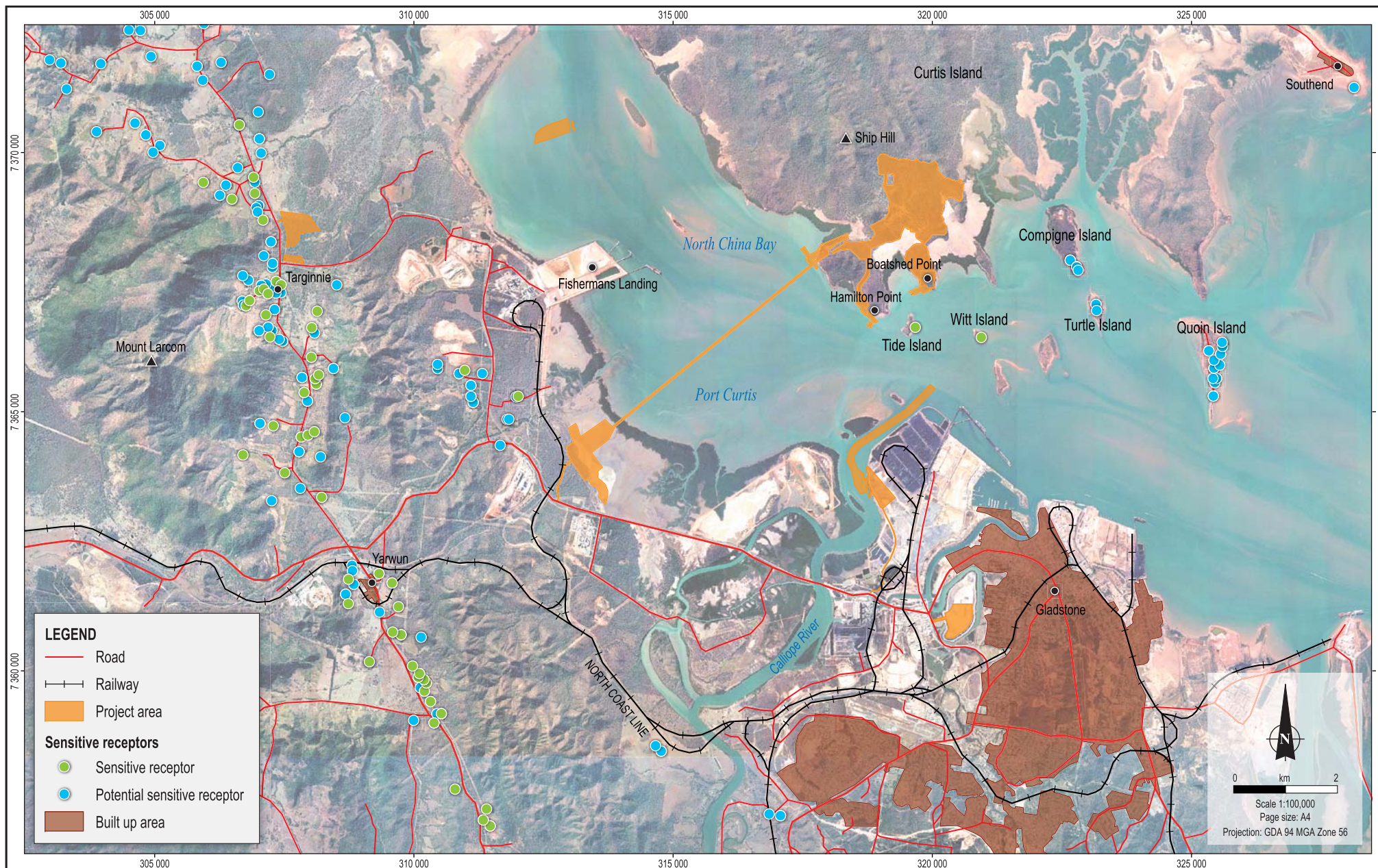
The zoning of land under the Calliope Shire Planning Scheme and the Development Scheme for the Gladstone State Development Area, and the Gladstone city land use zoning is shown on Figures 30.6 and 30.7 respectively.

30.3.7 Recreational and Commercial Fishing Activities

Gladstone Marina and Southend on Curtis Island are commonly used by the public as ports for access to a range of onshore and offshore recreational and commercial fishing activities. Boat ramps located at Goodoon Street, Hanson Road and Morgan Street in Gladstone, and South Trees Inlet at Toolooa provide access for recreational boats (Marine Queensland, 2011). Salmon, bream, whiting, grunter, flathead and barramundi are commonly targeted by recreational fishers (EPA, 2003).

The commercial fishing industry operating from Gladstone includes mud crab harvesting, reef line fisheries (coral trout and red emperor), otter trawl fisheries (prawn and scallop), beam trawling (prawn and bug), collecting fisheries (aquarium fish and beachworms) and net fisheries (mullet, mackerel, salmon, shark and whiting) (EPA, 2003). Areas of particular recreational and commercial fishing value include:

- The Narrows estuarine, waters which contain mangrove communities.
- Port Curtis coastal waters, which contain intertidal wetlands and seagrass communities.
- Cape Capricorn on the northeastern headland of Curtis Island.
- Capricorn Bunker Group offshore reefs.



Source:
Place names, roads and railways from DME.
Project area and sensitive receptors from Coffey Environments.
Western Basin Reclamation Area from Gladstone Ports Corporation.
Imagery from SPOT (2004-2007).

coffey
environments

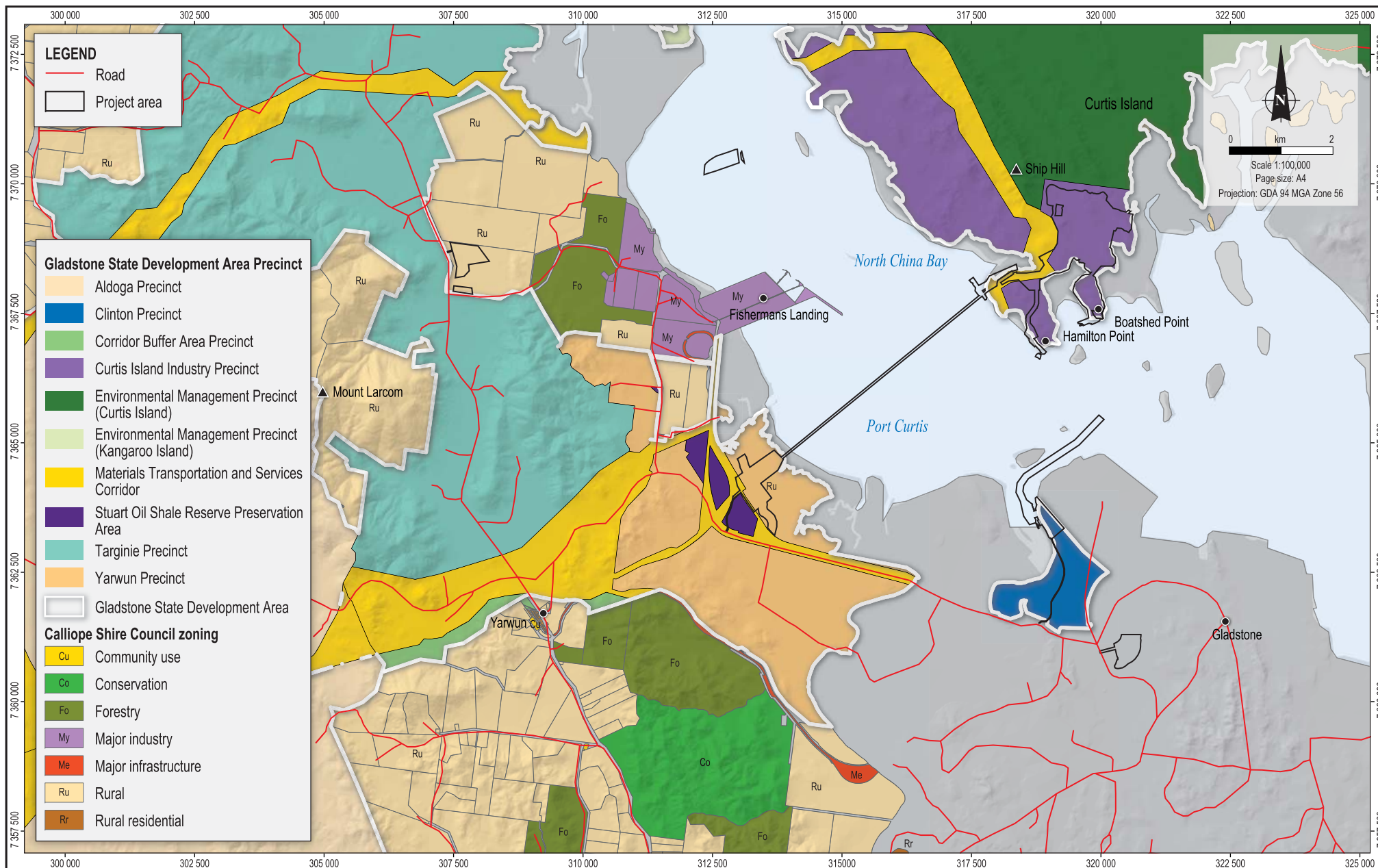
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25.11.2011
MXD:
7033CA_07_GIS045_v1_5
File Name:
7033_07_F30.05_GIS_GL

Arrow Energy
Arrow LNG Plant

arrowenergy
go further

Sensitive receptors

Figure No:
30.5



Source:
Place names and roads from DME.
Gladstone State Development Area from DIP.
Gladstone and Calliope zoning from Gladstone Regional Council.
Project area and digital elevation model from Coffey Environments.
Western Basin Reclamation Area from Gladstone Ports Corporation.

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environments

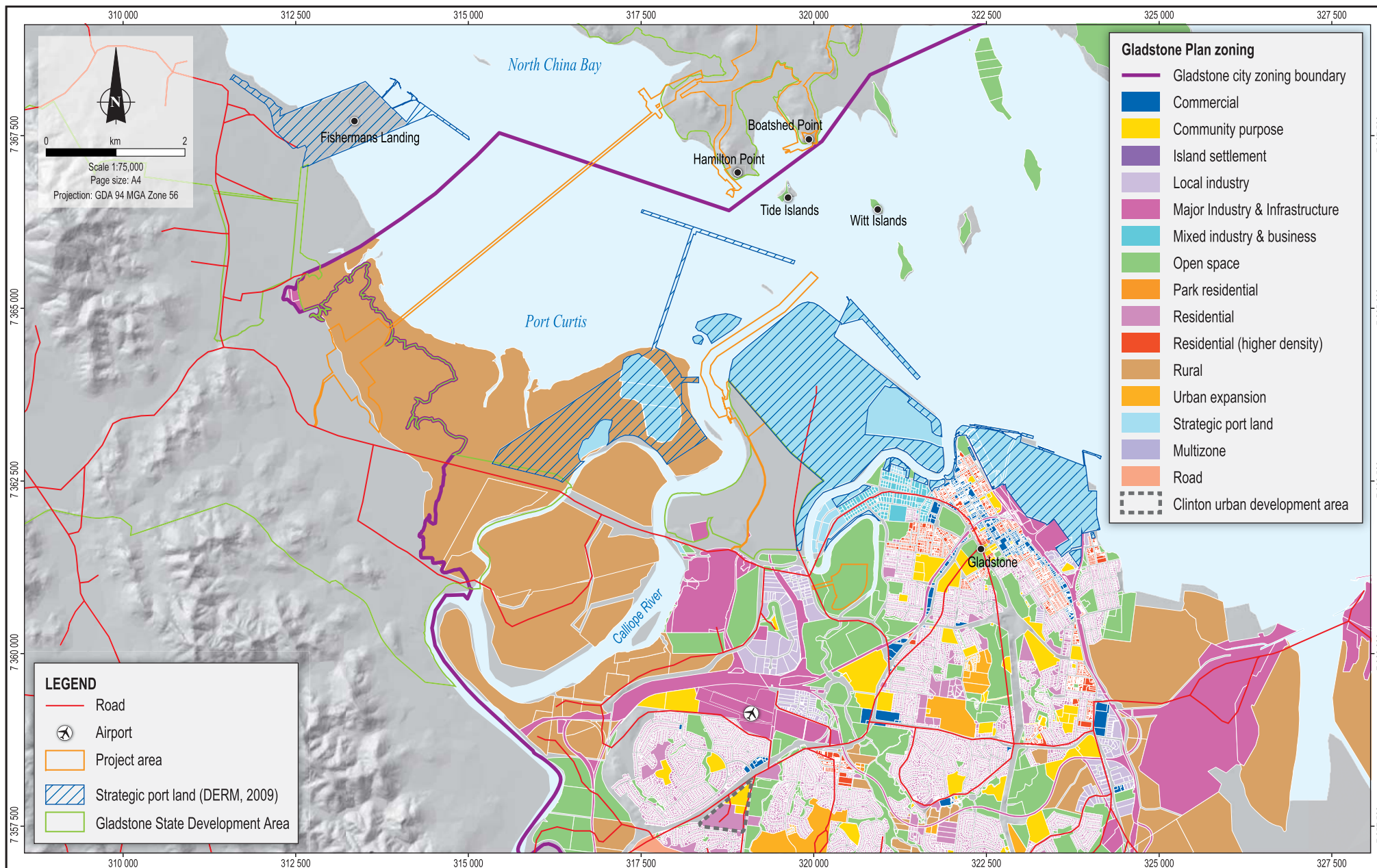
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13.02.2012
MXID:
7033CA_07_GIS046_v1_4
File Name:
7033_07_F30.06_GIS_GL

Arrow Energy
Arrow LNG Plant

arrow
go further energy

**Gladstone State Development Area and Calliope Shire
land use zoning**

Figure No:
30.6



Source:
Place names, roads and airports from DME.
Gladstone and Calliope zoning from Gladstone Regional Council.
Strategic port land from DERM Draft Coastal Management Plan (2009).
Project area from Coffey Environments.

coffey
environments

Date:
24.11.2011
MXID:
7033CA_07_GIS047_v1_7
File Name:
7033_07_F30.07_GIS_GL

Arrow Energy

Arrow LNG Plant

arrow
go further energy

Gladstone City land use zoning

Figure No:

30.7

These areas support high participation in both recreational and commercial fishing, trawling and crabbing activities (Coastal CRC, 2004). Recreational and commercial fishing values therefore include:

- Recreational fishing opportunities within Port Curtis, including public access to the coast.
- Commercial catch opportunities within Port Curtis and offshore.

30.3.8 International Treaties

Three Australian Government bilateral migratory bird agreements relevant to the study area are:

- Japan–Australia Migratory Bird Agreement (JAMBA).
- China–Australia Migratory Bird Agreement (CAMBA).
- Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA).

All migratory bird species listed in the annexes to these bilateral agreements are protected as matters of national environmental significance under the EPBC Act.

30.3.9 Environmentally Sensitive Areas

Environmentally sensitive areas containing cultural and biodiversity values within the Gladstone region and near to the project include:

- Great Barrier Reef World Heritage Area.
- Great Barrier Reef Marine Park.
- Great Barrier Reef Coastal Marine Park.
- Curtis Island National Park.
- Curtis Island State Forest.
- Coastal wetlands and seagrass communities along the southern coast of Curtis Island.
- Scenic coastal landscapes of Curtis Island and other islands lying within Port Curtis.
- Garden Island Conservation Park.
- Our Lady of the Sea Catholic Church, Gladstone.
- Civic Theatre, Gladstone.
- Port Curtis Wetland (listed in the Directory of Important Wetlands of Australia).
- Raglan Creek declared fish habitat area.
- Rodds Bay Dugong Protection Area.

The location of world heritage areas, national parks, state forests, conservation parks and important wetlands are shown on Figure 17.2. Fish habitat areas and protected marine areas are shown on Figure 19.1. Indigenous heritage sites are shown on Figure 24.1.

There are no wilderness areas or wildflower areas identified within the study area. The closest Ramsar wetland is the Shoalwater Bay and Corio Bay area, approximately 87 km north-northwest of the study area.

30.4 Issues and Potential Impacts

The consistency of the project with the long-term policy framework for the study area is described in this section. Potential adverse and potential beneficial impacts arising from construction, operation and decommissioning of the project on land-use environmental values identified above are also discussed.

30.4.1 Project Consistency with Policy Framework

This section discusses the projects consistency with existing land uses and/ long term policy framework, along with relevant legislation, standards, codes or guidelines available to monitor or

control operations on site. Included in this section is a brief description of core objectives of relevant Queensland and regional planning policies. A more detailed description is contained in Attachment 1, Relevant Legislation, Policies and Approvals. Table 30.5 shows that the project is generally consistent with the existing land uses and the long-term policy framework for the study area.

Table 30.5 Project consistency with policy framework

Intent of Policy	Project Consistency
<i>National Strategy for Ecologically Sustainable Development</i>	
The core objectives of the strategy include: • To enhance individual and community wellbeing through economic development that safeguards the welfare of future generations. • To provide for equity within and between generations. • To protect biological diversity and maintain essential ecological processes and life-support systems.	The project conforms with the objectives as follows: <i>Enhance Individual and Community Wellbeing</i> • Arrow Energy's Social Impact Management Plan (Attachment 7, Social Impact Management Plan) will contain a series of action plans directed towards ensuring that construction, operation and decommissioning of the project is conducted in a manner sustainable for the Gladstone community. These action plans will address housing and accommodation, community investment and wellbeing, the Indigenous community, workforce and training, local content and investment, community health and safety, community amenity and cumulative impacts of the project. • The project will deliver economic benefits to the community. These benefits are discussed in Chapter 27, Economics. • Arrow Energy maintains a comprehensive and integrated Health, Safety and Environmental Management System (HSEMS) aligned to the principles of the International Standard for Environmental Management Systems (AS/NZS ISO 14001) and the Australian Standard for Occupational Health and Safety Management System - (AS/NZS 4801:2001). <i>To provide for equity within and between generations</i> • Arrow Energy will implement business improvement activities. This involves operating in the most efficient ways possible at all levels in order to reduce waste and improve business practices, thereby returning greater value to customers, shareholders and the community. • Social Impact Management Plan action plans will address equity within and between generations through education and training initiatives for under-represented groups and students. <i>To protect biological diversity and maintain essential ecological life processes and life support systems</i> • Arrow Energy will strive to protect biological diversity and essential life processes through implementation of its integrated Health, Safety and Environmental Management System (HSEMS).

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
<i>Development Scheme for the Gladstone State Development Area (GSDA)</i>	
Objectives of the scheme include the orderly development of the GSDA in an ecologically sustainable manner. Uses considered highly likely to meet the objectives of the GSDA in the Curtis Island Industry Precinct include: gas transportation infrastructure, high impact industry limited to natural gas (liquefaction and storage) infrastructure facilities, local infrastructure and materials transport infrastructure. Uses considered highly likely to meet the objectives of the GSDA in the Boat Creek Corridor Sub-Precinct of the Materials Transportation and Services Corridor Precinct include gas transportation infrastructure facilities, local infrastructure and materials transport infrastructure. Gas transportation infrastructure is also considered highly likely to meet the objectives for the GSDA in the Curtis Island Corridor Sub-Precinct.	The Arrow LNG Plant comprises gas transportation infrastructure and natural gas liquefaction and storage facilities. The plant will co-exist with other approved LNG facilities under construction or planned for the Curtis Island Industry Precinct. The workers' accommodation facility proposed for Boatshed Point is ancillary to, and supports the development and operation of, natural gas facilities. The route of the feed gas pipeline commences in the Boat Creek Corridor Sub-Precinct of the Materials Transportation and Services Corridor Precinct and traverses an approximately 800-m stretch of the Yarwun Precinct to the tunnel launch site location. The tunnel is located on Curtis Island within the Curtis Island Corridor Sub-Precinct of the Materials Transportation and Services Corridor. The feed gas pipeline is highly consistent with Boat Creek Corridor Sub-Precinct and Curtis Island Corridor Sub-Precinct specified uses.
Uses considered highly likely to meet the objectives of the GSDA in the Yarwun Precinct include bulk stores, heavy industry, high impact industry, infrastructure facilities, liquid fuel depots, local infrastructure, materials transport infrastructure, medium industry, recycling industry and waste management.	Gas transportation infrastructure is not specifically listed as a use for the Yarwun Precinct. The feed gas pipeline could conflict with heavy industry and high impact industry uses. The feed gas pipeline route does not conflict with any current proposed developments. Given the linear nature of the infrastructure, substantial conflict is not expected.
Uses considered highly likely to meet the objectives of the GSDA in the Clinton Precinct include bulk stores, heavy industry, high impact industry, infrastructure facilities, liquid fuel depots, local infrastructure, materials transport infrastructure, medium industry, recycling industry and waste management.	Proposed launch site 1 at Calliope River is located within the Clinton Precinct. As a facility providing for storage and facilitating materials transportation from the mainland to Curtis Island, the facility is a consistent use.
<i>Gladstone Ports Corporation Land Use Plan (GPA, 1999) (current)</i>	
<i>Gladstone Ports Corporation Draft Land Use Plan (GPC, 2010b) (expected to enter into force)</i>	
The Land Use Plan (GPA, 1999) identifies strategic land necessary to the future growth and continued operations of the Port of Gladstone. Of particular relevance to the project is strategic port land at Clinton (near the mouth of the Calliope River) and Fishermans Landing. The Clinton area functions as an ash disposal area for the Gladstone Power Station, with reclaimed land to be used for the expansion of RG Tanna Coal Terminal and development of industry and storage facilities, which need a waterfront location. The Fishermans Landing area serves the interests of some of the industries establishing or expanding at the Yarwun and Aldoga industrial estates.	Proposed launch site 1 lies adjacent to Clinton area strategic port land. New development must be compatible with operations at the existing RG Tanna Coal Terminal. Proposed launch site 1 operations (including the dredging necessary to facilitate access to the site) are not expected to adversely affect operations at the coal terminal. The Western Basin Reclamation Area (location of proposed launch site 4N) was not envisaged at the time the plan was prepared, but is discussed under the Draft Land Use Plan (GPC, 2010b).

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
<i>Gladstone Ports Corporation Land Use Plan (GPA, 1999) (current)</i> <i>Gladstone Ports Corporation Draft Land Use Plan (GPC, 2010b) (expected to enter into force) (cont'd)</i>	
The intent of the 50-year Strategic Plan (GPC, 2008) is to inform stakeholders and the community about the future growth of the Port of Gladstone and Port Alma. The plan identifies the potential for two berths to accommodate future LNG exports at North China Bay and the opportunity to develop bulk, container or break bulk trade at Hamilton Point and Boatshed Point. The plan notes that safe passage can be provided to Hamilton Point for Capesize vessels (a Capesize vessel is typically greater than 150,000 long tons deadweight).	The LNG jetty associated with the Arrow LNG plant is proposed for North China Bay, adjacent to the northwest corner of Hamilton Point. The project is consistent with this plan.
The Draft Land Use Plan (GPC, 2010b) seeks to guide sustainable growth and development of the Port of Gladstone. Port planning localities of particular relevance to the project include RG Tanna Coal Terminal, Fishermans Landing and Curtis Island. The RG Tanna Coal Terminal locality (the Clinton area under the GPA (1999) Land Use Plan will continue to cater to the future needs of the coal terminal, and light industry and commercial development opportunities. The Fishermans Landing locality will see additional reclamation works and development of port facilities through Gladstone Ports Corporation projects. The purpose of the new wharf facilities will be to accommodate industrial requirements associated with the GSDA. Hamilton Point at the Curtis Island locality has been nominated for a possible common-user port facility.	New development near the RG Tanna Coal Terminal locality must be compatible with operations at the existing coal terminal. Proposed launch site 1 operations (including dredging necessary to facilitate access to the site) are not expected to adversely affect operations at the coal terminal. Development of launch site 4N at the northern end of the Fishermans Landing Northern Expansion reclamation area is consistent with the purpose of accommodating industrial requirements associated with the GSDA (i.e., servicing LNG facilities within the Curtis Island Industry Precinct). LNG operations in North China Bay are compatible with the development of a common user facility at Hamilton Point. The location and operation of the construction camp at Boatshed Point is unlikely to compromise the future orderly development of common user facility.
<i>Port of Gladstone Western Basin Master Plan (DIP, 2010a)</i>	
The Western Basin Master Plan provides a strategic land and port development framework that the Coordinator General can use to inform decisions related to current and future projects in the Western Basin and to ensure the area is developed in a coordinated and efficient manner. The plan describes matters that the Coordinator-General will take into account when determining land use within the Curtis Island Industry Precinct of the Gladstone State Development Area. Of particular relevance to the Arrow LNG Plant is discussion of Boatshed Point, Hamilton Point, Hamilton Point West and North China Bay.	Arrow Energy has been party to discussions with the Coordinator-General during the establishment of the Curtis Island Corridor Sub-Precinct, North Infrastructure Corridor Sub-Precinct and the Curtis Island Industry Precinct, and the project is consistent with this plan. The LNG shipping berth associated with the Arrow LNG plant will be located at North China Bay. Materials offloading facility (MOF) site options include Boatshed Point and Hamilton Point (North and South).

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
<i>Port of Gladstone Western Basin Master Plan (DIP, 2010a) (cont'd)</i>	
The plan recommends LNG shipping berth(s) be located at Hamilton Point West (rather than Boatshed Point) to minimise loss of seagrass associated with dredging and enable proponents to take advantage of shared port facilities. A Hamilton Point Land Use Plan will be developed in consultation with Gladstone Ports Corporation and LNG proponents to identify the extent and location of common-user infrastructure corridor at Hamilton Point to service North China Bay, Boatshed Point and Hamilton Point West. Hamilton Point has also been nominated as a possible location for a common-user material offloading facility. The Coordinator-General will encourage proponents to collaborate on common-user infrastructure.	
The master plan also recommends the creation of a common-user shipping channel to service North China Bay as shipping access requires substantial dredging, the creation of a berth swing basin and materials offloading facility adjacent to Hamilton Point West.	
The master plan provides high-level strategic environmental direction and will act as a catalyst for an environmental management plan for the whole Western Basin. The master plan identifies potential areas under consideration for environment offsets. These include Kangaroo Island and an area of strategic port land east of Balaclava Island in Port Alma.	The project does not impact on Kangaroo Island or Balaclava Island, two possible areas identified for environmental offsets under the Western Basin Master Plan, and is therefore consistent with this plan. Environmental offset requirements for the project will be determined through state and Commonwealth approvals processes. Arrow Energy will consult and be guided by the Queensland Government should the need for environmental offset areas arise. This includes having regard to the provisions of any future Western Basin environmental management plan.
The master plan identifies pipeline route options being investigated to cross The Narrows.	Not relevant to the Arrow LNG Plant due to Arrow Energy's investigation of a tunnel option to cross Port Curtis.
<i>State Coastal Management Plan/Curtis Coast Regional Coastal Management Plan (DERM, 2002a) (current)</i> <i>Queensland Coastal Plan (DERM, 2011a) (expected to enter into force)</i>	
The State Coastal Management Plan sets out the overall position for coastal management in Queensland through stated outcomes, principles and policies. Key principles of the plan that have a development focus include: • The cumulative impacts of human use are taken into account in planning and managing coastal resources. • Coastal use and development is planned and managed to ensure significant adverse effects of activities on the natural environment are mitigated and remedied. • Development and use of the coast maintains and where possible enhances the quality of life for residents and visitors.	The project is generally consistent with the plan. The project is consistent with the plan as follows: • Liquefaction and export of natural gas is a coastal-dependant land use. Locating the Arrow LNG plant in the Curtis Island Industry Precinct is consistent with Section 2.1.3, Coastal-dependent land uses. Co-locating LNG facilities is a measure to minimise adverse impacts by the LNG industry on coastal resources. • The development of maritime structures (LNG jetty, personnel jetty and MOF) associated with the Arrow LNG Plant constitutes major private infrastructure and is consistent with Section 2.1.5, Maritime infrastructure. • Dredging activities will be undertaken with regard to the dredging policy set out Section 2.1.8, Dredging.

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
<i>State Coastal Management Plan/Curtis Coast Regional Coastal Management Plan (DERM, 2002a) (current)</i>	
<i>Queensland Coastal Plan (DERM, 2011a) (expected to enter into force) (cont'd)</i>	
• Trends in climate change including sea level rise, more extensive storm tide flooding and associated potential impacts are taken into account in the planning process. • The public expectation to access the coast from both land and water is recognised. • Access to the coast is planned and managed to protect the coastal resources, their values and public safety. • The release of contaminants into watercourses, estuaries and the ocean is eliminated where practicable, and otherwise managed in accordance with best practice environmental objectives to ensure that the level and type of contaminants do not exceed water quality objectives.	• The development of the project is considerate of climate change adaptation measures set out in Section 2.1.1. • There will be a loss of public access to the south coast of Curtis Island due to safety exclusion zones around the LNG facilities. This is acceptable under Section 2.3.1, Future need for access, where infrastructure is of state economic significance and protection of coastal resources is not compromised. • Hydrodynamic modelling, marine water quality and coastal processes technical studies have been prepared for the project to assess the potential impacts on water quality and identify appropriate mitigation measures for any significant impacts.
The Curtis Coast Regional Management Plan contains specific desired coastal outcomes in relation to southwest Curtis Island. These include: • Planning for future development appropriately identifies and takes into consideration the values of areas of high conservation significance including the cumulative impacts of associated development on these values. • Planning for future development considers the design and location of development ensuring any impacts on the scenic coastal landscape values of the island are minimised. A specific desired outcome in relation to Gladstone Harbour includes the harbour's ability to provide for a range of uses while ensuring conflicts between uses are managed and adverse impacts on coastal resources and values are minimised.	The project is consistent with the desired Curtis Island outcomes such that project planning, construction and operational activities will seek to minimise impacts on areas of high conservation significance and landscape value. The project is consistent with the desired outcomes for Gladstone Harbour such that marine traffic associated with the Arrow LNG Plant (materials and personnel transportation and LNG shipping) will be coordinated with other harbour users.
Principles of the Queensland Coastal Plan include but are not limited to: • Public access and use of the coast is maintained and enhanced for current and future generations. • Buildings and structures (including all infrastructure) are established on state coastal land only where they are essential, provide a public service, and cannot be feasibly located elsewhere. • Management and use of coastal land are guided by local plans of management (such as the Curtis Coast Regional Coastal Management Plan).	The project is generally consistent with the Queensland Coastal Plan per the discussion above.

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
<i>Central Queensland Regional Growth Management Framework (CQRPAC, 2002)</i>	
The framework sets out a regional vision for Central Queensland built around guiding principles in the areas of resource use; conservation and management; economic development; infrastructure; social and cultural development; education, training and research; and planning and governance. A set of integrated outcome statements, strategies and actions draws principles together to guide future growth and development of the region.	The project is consistent with the integrated guiding principles and outcomes statements of the framework. The project provides a significant opportunity to diversify the regional and state economy and local employment base of Gladstone through its contribution to developing an LNG export industry.
<i>Gladstone Region Community Plan (GRC, 2011a)</i>	
The Gladstone Regional Community Plan aligns a number of existing regional plans and studies to provide a detailed vision for the future of the region. Strategies for achieving the vision are described according to themes of economy, society, environment and governance. The community plan will help inform the development of the Gladstone Regional Council consolidated planning scheme.	Key ways in which the project is consistent with the plan include: • The Arrow LNG Plant is a large-scale industrial development project, which will contribute to Gladstone's economic potential through the exploitation of the city's deep-water port. It will also contribute to the growth of Gladstone's export capacity. • The project will facilitate local industry skills development and supply opportunities. • Social and environmental management and mitigation measures seek to address issues raised by the project and identified in the community plan, including housing affordability, the protection of environmental values and appropriate community engagement.
<i>Planning Schemes of the Gladstone Regional Council</i>	
The Calliope Planning Scheme and Gladstone Plan apply to the project to the extent that proposed self-assessable and assessable development are not regulated through other legislation or statutory planning instruments such as the Development Scheme for the Gladstone State Development Area or the Gladstone Ports Corporation (1999) Land Use Plan.	TWA 8 is located outside both the GSDA and strategic port land. TWA 8 will be designed consistent with the planning scheme as a code assessable material change of use under the Calliope Shire Planning Scheme Rural Zone. TWA 7 will be designed to be consistent with the planning scheme as an impact assessable material change of use under the Gladstone City Open Space zone.
<i>State Planning Policies</i>	
SPP 1/92 Development and the Conservation of Agricultural Land seeks to conserve and manage good quality agricultural land for the longer term by protecting land from development that leads to alienation of land or diminished productivity.	The Calliope Shire Planning Scheme does not identify good quality agricultural land on Curtis Island. The mainland features small pockets of Class A cropland, Class C pastureland and Class D non-agricultural land. Some pastureland will be lost in order to facilitate the development, which requires access to the coast.
SPP 1/02 Development in the Vicinity of Certain Airports and Aviation Facilities seeks to ensure that developments do not adversely affect the safety and operational efficiency of aviation facilities, or expose the public using facilities to an increase in aircraft noise or safety risks near airport runways.	The project will not expose the public to increases in aircraft noise or safety risks near airport runways. The project is consistent with the policy.

Table 30.5 Project consistency with policy framework (cont'd)

Intent of Policy	Project Consistency
State Planning Policies (cont'd)	
SPP 2/02 Planning and Managing Development Involving Acid Sulfate Soils seeks to avoid potential adverse effects on the natural and built environment and human health associated with development involving acid sulfate soils.	Actual and potential acid sulfate soils exist between 0 to 20 m AHD. The project is consistent in that consideration will be given to acid sulfate soils management in engineering design and when undertaking construction activities in low-lying coastal areas.
SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide seeks to minimise potential adverse effects of flood, bushfire and landslide on people, property, economic activity and the environment.	The Calliope Shire Planning Scheme identifies the LNG plant site and feed gas pipeline route as experiencing medium bushfire hazard. A small area of the LNG plant also has a slope greater than 15% leading to landslide hazard. The project will be consistent in that engineering design will take slope issues into consideration and an appropriate bushfire management plan will be adopted.
SPP 1/07 Housing and Residential Development including Guideline.	The project is consistent in that a housing and accommodation action plan has been developed as part of the social impact management plan for the Arrow LNG Plant. The purpose of the action plan is to manage the increased pressure placed on the Gladstone Regional Council area housing market and also increased utilisation of temporary accommodation such as hotels, motels and serviced apartments.
SPP 2/07 Protection of Extractive Resources aims to protect extractive resources of state or regional significance that may be constrained by virtue of development activities.	The development does not impact on existing key resource areas, resource or processing areas or their associated transport routes.
Temporary SPP 1/10 Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments seeks to avoid further loss or degradation of natural wetlands, unless an overriding public interest can be shown.	The project will be designed, constructed and operated to minimise loss or degradation of wetlands. Loss of wetlands (if applicable) will be offset as part of an environmental offset strategy to be developed for the project in consultation with DERM and DSEWPC and other government stakeholders prior to commencement of construction.

30.4.2 Compatibility with Surrounding Land Uses and Human Activities

Changes to surrounding land use, compatibility with existing human activities and impacts on land environmental values are discussed below in relation to activities within the Curtis Island Industry Precinct and surrounds, Gladstone and surrounds, and Port Curtis.

Curtis Island Industry Precinct and Surrounds

The conceptual Arrow Energy LNG plant design on Curtis Island has been developed considering safety and separation distances, optimum use of land, compliance with regulations and standards, modular construction, future expansion, logical product flow, constructability, minimum cut and fill, measures to avoid hot air recirculation, and avoiding environmental harm to adjacent areas.

The LNG plant will have a low impact on neighbouring LNG facilities within the Curtis Island Industry Precinct because the project has a consistent land use and has been designed with adequate safety separation distances from other LNG facilities. The construction and operation of

the main construction camp at Boatshed Point will not impede future development of Hamilton Point and the camp has low impact on strategic port land.

An alternative site for the MOF is located at the southwest tip of Hamilton Point, although there are risks associated with the scheduling conflicts, congestion, and commercial negotiations associated with the development of this site, and the associated haul road running up the centre of Hamilton Point, which would need to be progressed should this option be pursued.

The construction, operation and decommissioning of the LNG plant will have a low impact on recreational activities within environmental and conservation areas of Curtis Island as no clearing, bulk earthworks, infrastructure, buildings or structures will be located in these areas. The environmental management precinct on Curtis Island is located immediately to the north of the LNG plant site.

The LNG plant and associated loading facilities will have land and marine safety exclusion zones, which will restrict public access to specific land, intertidal areas and marine areas for recreational and commercial fishing and boating activities. The significance of this impact on recreational fishing opportunities will be moderate for the life of the project, and low in terms of disruption to commercial catch opportunities.

City of Gladstone and Surrounds

The pipeline will have a low impact on potential development opportunities associated with the Yarwun Precinct of the GSDA. As stated in Table 30.5, the feed gas pipeline could conflict with future heavy industry and high impact industry uses, for which the precinct is earmarked. However, the feed gas pipeline route does not conflict with any current proposed developments. Substantial conflict is not expected.

There is potential for the feed gas pipeline easement and tunnel to overlap mineral development licences 177 and 225. However, this area is presently subject to Restricted Area Notice 381 under s. 391 of the *Mineral Resources Act 1989* (Qld), which prohibits the application for mining tenements over areas of Curtis Island and the GSDA. The notice was gazetted on 20 November 2009 (Queensland Government, 2009). Should the project proceed and potential for conflict arises, Arrow Energy will need to enter into a coordination agreement with the minerals tenement holder. The impact of the project on these resources is considered low.

In terms of property disruption and fragmentation for private landowners along the feed gas pipeline route, the impact is considered moderate during construction and low during operation. Construction may involve disruption to utility services, property access, fencing, and the conduct of existing activities on the property. New access and feed gas pipeline crossing points will be negotiated, designed, constructed and supervised in consultation with landowners. During operation, directly affected landowners will experience some restrictions on ground-disturbing activities that they are able to conduct within the feed gas pipeline easement, and a reduction in allowable land use activities within the feed gas pipeline easement and right of way. Decommissioning will have a negligible impact.

Where land is required for the project, fragmentation, sterilisation and ongoing compatible land use will be key considerations of land access negotiations.

Impacts on good quality agricultural land, specifically Class A cropland, will be low as the only place this land class is mapped is at the TWAF 8 site. The site is not being used for agricultural purposes.

Development of a TWAF, mainland launch site and the tunnel entry will require access to services such as electricity and water, and the development of new access tracks. Access arrangements will be agreed and works will be undertaken by Energex, Gladstone Area Water Board, Department of Transport and Main Roads, or Gladstone Regional Council as appropriate, depending on final project design. Arrow Energy or its contractors may also undertake works as required and feasible. Road access or crossing easements will be negotiated as necessary with relevant electricity, water and telecommunication services.

The impact of developing TWAF 7 and launch site 1 on a former Gladstone Power Station ash pond site is considered negligible. These sites are highly disturbed with no biodiversity conservation assets and reuse of the ash pond site for a TWAF is supported by Gladstone Regional Council.

Port Curtis

Construction (including associated dredging) and operation of launch site 1 is expected to have a low impact on the adjacent strategic port land, including the operation of the RG Tanna Coal Terminal, because activities will be managed in accordance with the standard for marine construction activities in Gladstone Harbour (MSQ, 2011b) and the port procedures manual (MSQ, 2010). Due to harbour safety procedures, the impact on other port commercial and recreational users is also considered low.

30.4.3 Native Title

Consultation is underway between Arrow Energy, native title claimants, and the native title claimants advisers as part of an Indigenous Land Use Agreement (area agreement) process that commenced in August 2010. The Indigenous Land Use Agreement will address the requirements of s. 24NA of the Native Title Act (future acts in offshore places) and any other future act provisions. As of November 2011, a series of eight meetings have been held with Port Curtis Coral Coast People applicants, with further progress pending Federal Court directions hearings regarding the applicants on the QC01/29 claim. The purpose of the Indigenous Land Use Agreement is to provide for all native title approval for the project.

Impact of the project on Indigenous cultural resources is discussed in detail in Chapter 24, Indigenous Cultural Heritage.

30.4.4 Proximity to Electric Power Transmission Lines and Electrified Rail Lines

The rail loop that connects Cement Australia's East End Mine at Mount Larcom to the company's cement plant at Fishermans Landing traverses the study area. Powerlink high voltage powerlines ranging from 275 kV to 110 kV from the Gladstone Power Station also traverse the study area in the vicinity of Gladstone–Mount Larcom Road.

Arrow Energy has consulted with infrastructure operators including QCL, Rio Tinto, Orica and Powerlink on the feed gas pipeline and tunnel alignment, proposed construction techniques, detailed design of feed gas pipeline crossings of infrastructure and easements, and construction supervision protocols.

Two possible access routes to the mainland launch site 1 are being investigated, one from Bryan Jordon Drive and the other from the Gladstone–Mount Larcom Road. In both instances, existing access tracks and haul roads will require upgrading and sealing to provide all weather access to the site should the launch site option be pursued. The access route from Gladstone–Mount

Larcom Road is preferred as it does not involve a railway crossing, which imposes height restrictions and would require additional and specific management of safety issues.

Construction, operation and decommissioning of the feed gas pipeline and other mainland infrastructure will have a low impact on existing and proposed rail and high voltage power transmission and other infrastructure. The impact has been rated as low as a safety management plan will be developed for the construction and operation phases of the project. The plan will detail the measures that will be implemented to reduce the risks associated with vehicles, staff, plant and machinery operating in proximity to power transmission lines and electrified rail lines.

30.4.5 Telecommunications

Telecommunications for the project will be provided by either fibre optic telecommunications cable or telecommunications tower (microwave) and radio mast.

During the construction phase of the project, mobile phone connection may be the primary telecommunications method, using the microwave tower and radio mast. The current infrastructure has 18 mbit/sec spare capacity, which is sufficient to allow for the Arrow LNG Plant requirements as well as growth in demand in Gladstone.

For the operation phase, Arrow Energy proposes to co-locate a 30 strand, fibre optic cable in the pipeline tunnel from the mainland to Curtis Island, with indicative bandwidth of 100 Mb/sec for use by the LNG plants. Backup supply will be via two satellite communication systems. Telecommunication providers are also investigating high capacity digital radio from Gladstone.

Additional infrastructure that may attract a contribution from Arrow Energy would include infrastructure of a temporary nature, e.g., services to camps or construction contractors. The impact of the project on telecommunications infrastructure is therefore expected to be negligible for both the LNG plant site and onshore activities.

Telecommunication devices can potentially interfere with the operation of navigational aids and therefore could have a moderate impact on navigation infrastructure or services during construction and operation of the project. This issue will be discussed with the Regional Harbour Master of Gladstone when final equipment is selected.

30.4.6 Millable Timber and Quarry Resources

No millable timber within a state forest will be impacted by the project because no activities will be undertaken within state forest. A low impact on millable timber on Curtis Island will occur during the construction phase due to the clearance of vegetation for the LNG plant and ancillary facilities. Millable timber will be identified prior to bulk earthworks and will be cut using appropriate techniques. Impacts will be negligible during operation and decommissioning because timber removal will have already occurred.

The impact on millable timber during the construction phase of the feed gas pipeline will be low due to vegetation clearing along the pipeline right of way. The impact will be negligible during operation and decommissioning because timber removal will have already occurred.

The study area is sufficiently distant from known quarry resources (i.e., sand, gravel, quarry rock, clay and soil). Development within the study area will have negligible impact on these resources during the construction, operation and decommissioning phases as project activities are not in close proximity to these resources. If aggregate and structural fill for construction activities is sourced from the Yarwun key resources area, the impact on these resources will increase

depending on the amount of material required for the final project design. Sources of aggregate and structural fill are not known at this stage of project development.

30.4.7 Impact Assessment Summary

Table 30.6 presents a summary of the issues described above and shows how significance has been determined considering sensitivity of values and magnitude of impact.

Table 30.6 Summary of impacts and significance (premitigation measures)

Land Use and Planning Impact	Project Phase	Sensitivity	Magnitude	Significance
<i>LNG Plant, Ancillary TWAfs and Ancillary Marine Facilities</i>				
Outdoor recreational activities in Curtis Island conservation areas.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Approved LNG development within the Curtis Island Industry Precinct.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Strategic port land development opportunities at Hamilton Point.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Impacts of project on key extractive resources.	Construction	Low	Low	Negligible
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible
Impacts of project on millable timber.	Construction	Low	Moderate	Low
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible
Operability of telecommunications network.	Construction	Low	Low	Negligible
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible
Recreational fishing opportunities within Port Curtis including public access to the coast.	Construction	Moderate	Moderate	Moderate
	Operation	Moderate	Moderate	Moderate
	Decommissioning	Moderate	Low	Low
Safety at sea (telecommunications impact on navigational aids).	Construction	Moderate	Moderate	Moderate
	Operation	Moderate	Moderate	Moderate
	Decommissioning	Moderate	Low	Low
Commercial catch opportunities within Port Curtis and offshore.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
<i>Feed Gas Pipeline, Tunnel, TWAfs and Launch Sites</i>				
Development opportunities associated with the GSDA (i.e., pipeline in Yarwun Precinct).	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low

Table 30.6 Summary of impacts and significance (pre mitigation measures) (cont'd)

Land Use and Planning Impact	Project Phase	Sensitivity	Magnitude	Significance
<i>Feed Gas Pipeline, Tunnel, TWAfs and Launch Sites (cont'd)</i>				
Existing land use (property disruption and severance, fragmentation of sites).	Construction	Low	High	Moderate
	Operation	Low	Moderate	Low
	Decommissioning	Low	Low	Negligible
Good-quality agricultural land (Class A cropland).	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Mining tenements associated with the Stuart Oil Shale resource.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Operability of electric-power transmission lines and electrified rail lines.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Operability of telecommunications network.	Construction	Low	Low	Negligible
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible
Operations undertaken on strategic port land (e.g., RG Tanna Coal Terminal).	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Other commercial maritime operations within the Port of Gladstone (including tourism).	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Recreational activities associated with the harbour including boating, fishing and sailing.	Construction	Moderate	Low	Low
	Operation	Moderate	Low	Low
	Decommissioning	Moderate	Low	Low
Impacts of project on millable timber.	Construction	Low	Moderate	Low
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible
Impacts of project on key extractive resources.	Construction	Low	Low	Negligible
	Operation	Low	Low	Negligible
	Decommissioning	Low	Low	Negligible

30.5 Avoidance, Mitigation and Management Measures

This section describes the management measures intended to reduce potential moderate land use impacts to as low as reasonably practicable. Mitigation measures have not been proposed for potential low or negligible impacts.

While the change of land use within the project area cannot be avoided if the project is to proceed, the following measures will be implemented to manage impacts on land use environmental values in the study area:

- Design the feed gas pipeline to minimise the project land requirement and extent of potential disruption to existing and alternate land uses. [C30.01]
- Site, design, construct and operate project components having regard to legislation, policy, and statutory instruments and guidelines. Compliance with design codes and standards of the project components during construction, operation and decommissioning will be assessed and determined through a range of post EIS applications for approvals, permits and licences. [C30.02]
- Establish exclusion zones around the LNG plant and maritime areas to ensure the safety of LNG personnel, the public, shipping and maritime assets, and do not unnecessarily prevent public access to areas of coastline. [C30.03]
- Prior to construction, consult landowners within the project area on the potential direct impacts to their assets, land use activities, and any temporary disruption to supporting utility services and infrastructure. This consultation will inform the final property-specific design and mitigation measures. [C30.04]
- Liaise with the Regional Harbour Master of Gladstone on the potential for telecommunications devices to affect aids to navigation infrastructure or services. [C30.05]

Decommissioning and rehabilitation measures for the project area have been included in the environmental management plan included as an attachment to this EIS (Attachment 6, Environmental Management Plan). The final land use will be determined through consideration of a number of factors, including, but not limited to:

- Relevant legislative and regulatory requirements of the day.
- Views of stakeholders, landowners and the local community.
- Surrounding land uses.
- Surrounding sensitive receptors and receiving environments.
- The environmental, social and cultural values of the area.

30.6 Residual Impacts

Table 30.7 summarises land use impacts and significance, prior to and following the application of mitigation measures. Where the original impact was deemed low or negligible, the assessment remains the same as Table 30.6.

Restrictions to public access around the LNG plant and marine facilities are required for public safety. The impact will therefore remain the same post mitigation.

The design of telecommunications for the project will be developed in consultation with the Gladstone Harbour Master to ensure there is no impact on navigational aids within the harbour.

The impact on existing land use will be reduced to as low as reasonably practicable through consultation with landowners and facility owners about the pipeline construction process and methods.

Table 30.7 Summary of impacts and significance (premitigation and post mitigation)

Land Use and Planning Impact	Project Phase	Sensitivity	Magnitude	Significance (Premitigation)	Significance (Post mitigation)
LNG Plant, Ancillary TWAFs and Ancillary Marine Facilities					
Recreational fishing opportunities within Port Curtis including public access to the coast.	Construction	Moderate	Moderate	Moderate	Moderate
	Operation	Moderate	Moderate	Moderate	Moderate
	Decommissioning	Moderate	Low	Low	Low
Safety at sea (telecommunications impact on navigational aids).	Construction	Moderate	Moderate	Moderate	Negligible
	Operation	Moderate	Moderate	Moderate	Negligible
	Decommissioning	Moderate	Low	Low	Negligible
Feed Gas Pipeline, Tunnel, TWAF and Launch Site					
Existing land use (property disruption and severance, fragmentation of sites).	Construction	Low	High	Moderate	Low
	Operation	Low	Moderate	Low	Low
	Decommissioning	Low	Low	Negligible	Negligible

30.7 Inspection and Monitoring

Arrow Energy will carry out ongoing checks for compliance with agreements with landowners and infrastructure operators regarding facilities construction and operation (feed gas pipeline, tunnel operations, TWAF and mainland launch site).

30.8 Commitments

The measures (commitments) that Arrow Energy will implement to manage impacts on land use and planning are set out in Table 30.8.

Table 30.8 Commitments: Land use and planning

No.	Commitment
C30.01	Design the feed gas pipeline to minimise the project land requirement and extent of potential disruption to existing and alternate land uses.
C30.02	Site, design, construct and operate project components having regard to legislation, policy, and statutory instruments and guidelines. Compliance with design codes and standards of the project components during construction, operation and decommissioning will be assessed and determined through a range of post EIS applications for approvals, permits and licences.
C30.03	Establish exclusion zones around the LNG plant and maritime areas to ensure the safety of LNG personnel, the public, shipping and maritime assets and do not unnecessarily prevent public access to areas of coastline.
C30.04	Prior to construction, consult landowners within the project area on the potential direct impacts to their assets, land use activities, and any temporary disruption to supporting utility services and infrastructure. This consultation will inform the final property-specific design and mitigation measures.
C30.05	Liaise with the Regional Harbour Master of Gladstone on the potential for telecommunications devices to affect aids to navigation infrastructure or services.