

Figure 4.2 Precincts of Gladstone State Development Area (GSDA)

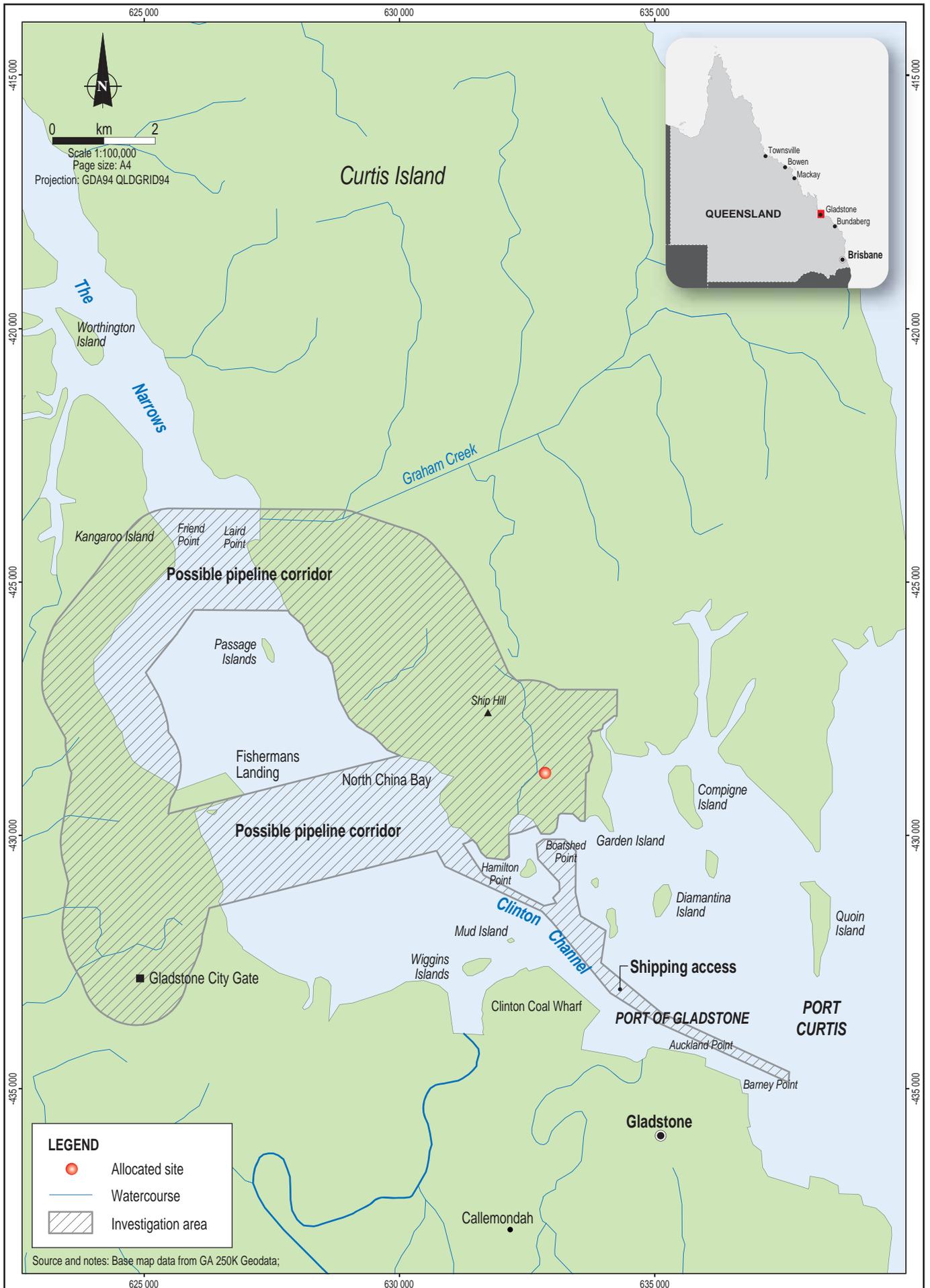


Figure 4.3 Investigation area

4.3 Proposed Infrastructure

Shell Australia's proposed development comprises an LNG plant, LNG loading facility, gas pipeline from the Gladstone City Gate, and ancillary infrastructure including shipping channels, quarantine and temporary construction facilities and a materials offloading facility. Key project components are described in detail below.

LNG Plant and Associated Infrastructure

The proposed LNG plant will be developed within a broad investigation area (denoted by hatched area on Figure 4.3) that encompasses the site granted to Shell Australia. Whilst the detailed process to be used in the proposed LNG plant is not yet defined, a simplified process diagram for typical LNG production is shown in Figure 4.4.

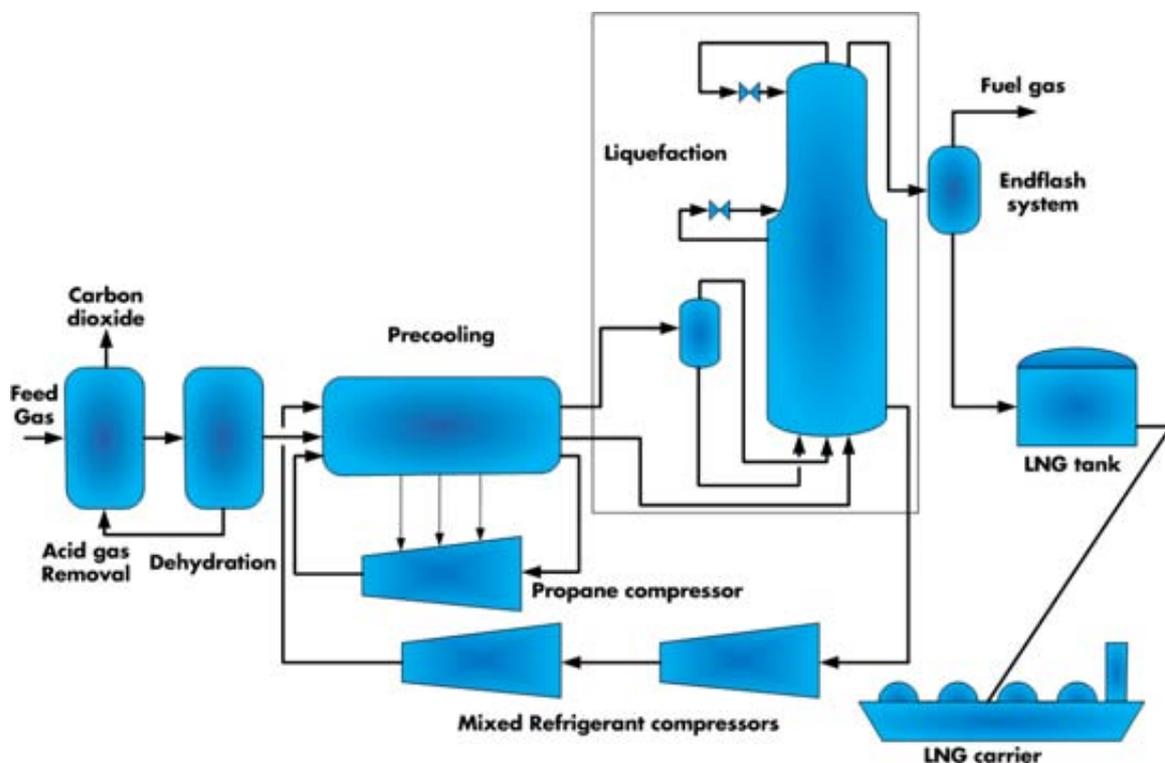


Figure 4.4 Simplified process diagram for LNG production

Gas will be transmitted in a pipeline from the Gladstone City Gate or new facility nearby to the LNG plant across Port Curtis by a route yet to be identified. Two options are being investigated—a direct route from near Fisherman's Landing to near Hamilton Point and an indirect route across The Narrows between Friend and Laird points.

Key features of the LNG plant and associated infrastructure include:

- The plant would be designed for a maximum capacity of 16 Mtpa, involving phased construction of up to four trains, each with a 3 Mtpa to 4 Mtpa capacity.
- Tankage, LNG and LPG storage and loading lines will be encompassed within the site.

- The LNG plant is to be designed to ensure flare and hazard zones are contained within site.
- LNG loading facility including a jetty is to be located at either North China Bay or Boatshed Point.
- A materials offloading facility is required at either North China Bay or Boatshed Point.
- Temporary facilities during construction including possible construction camp, construction offices, amenities, workshops and laydown areas, and water and wastewater treatment and power generation facilities.

Access

Shell Australia's application will be developed in conjunction with Gladstone Ports Corporation's Port of Gladstone Western Basin Strategic Dredging and Disposal Project which was declared a significant project for which an EIS is required - on 24 April 2009. Shell Australia's requirements include:

- Dredging channels within and from main shipping channels to Boatshed Point or North China Bay.
- Access during the construction and operation phases, via ferry and/or barge.

It is noted that the Queensland Government is currently considering common infrastructure requirements, which may include land access via road and a bridge over The Narrows. Shell Australia will liaise with appropriate government departments in relation to common infrastructure.

A haul road will be constructed from the materials offloading facility to the LNG plant site.

Gas Pipeline

- A high pressure gas pipeline from Gladstone City Gate to the LNG plant site, including a submarine crossing of Port Curtis or The Narrows.
- Metering stations at the Gladstone City Gate and LNG plant site.

4.4 Construction

4.4.1 Land-based Activities

Pre-construction Activities

Prior to commencing major construction, the following pre-construction activities will need to be undertaken:

- Construction of temporary access roads to the LNG facility site from the coastal landing site.
- Erection of lease boundary markers and exclusion and safety fencing.
- Site preparation, including clearing of vegetation and watercourse diversion (if required). Cut vegetation will be carried to a designated stockpile area for later reuse for soil stabilisation and rehabilitation works. Topsoil will be progressively stripped and either used in rehabilitation works or stockpiled in spoil areas on the site.

- Construction of temporary facilities including water treatment and supply, power generation and temporary accommodation.

All areas proposed for construction activities will be surveyed for archaeological material prior to site clearance.

Construction Activities

Major construction phases for the project include:

- Bulk earthworks to establish the LNG plant site formation, including blasting where necessary.
- Foundation construction for major infrastructure items.
- Construction of LNG train and tank foundations (including any piling).
- Delivery to site of prefabricated modules or materials (steelwork etc.) and the installation of the LNG trains.
- Construction of storage tanks.
- Construction of control, administration, maintenance and amenity buildings, and emergency response facilities.
- Construction of the gas pipeline from the Gladstone City Gate to the LNG plant including clearing vegetation, excavating the trench, stringing, welding and laying the pipe, backfilling, hydrostatic testing and rehabilitation.

4.4.2 Marine-based Activities

Marine access to Shell Australia's LNG facility will be coordinated with the Queensland Government's Gladstone Port Western Basin Master Plan and strategies currently being initiated for the required dredging of Port Curtis. Shell Australia will liaise and cooperate with Gladstone Ports Corporation to ensure appropriate requirements are met for both organisations.

Construction activities within the marine environment of Port Curtis will include:

- Dredging to accommodate shipping access and a swing basin. This would require deepening and possibly widening of the Clinton Channel and dredging of a new channel and swing basin either at Boatshed Point or adjacent to North China Bay. Potential dredge spoil locations will need to be assessed and dredging guidelines for testing will be followed to allow safe handling in the event of contaminated dredged material.
- Disposal of excess dredged spoil.
- Construction of the materials offloading facility.
- Construction of the jetty and loading facility.
- Construction of a pipeline under The Narrows or across Port Curtis.

4.5 Environmental Rehabilitation

Following construction, commissioning and start-up, temporary worksites will be rehabilitated. This will involve the removal of construction waste materials, temporary buildings and construction equipment. Where practicable, areas no longer required for construction or support

services will be stabilised and revegetated. Comprehensive vegetation surveys will be undertaken prior to any clearing, and revegetation species will be selected on the basis of the pre-construction vegetation communities identified.

4.6 Testing and Commissioning

Start-up and commissioning activities will test the components of the LNG plant and associated infrastructure for correct operation. From both operational and environmental perspectives, hydrostatic testing is a significant procedure. LNG and LPG storage tanks, facility piping systems, transmission pipeline connections and other pressure equipment will be subjected to water pressures in excess of normal operating limits, so that leaks can be identified and repaired. Hydrostatic test water will be treated and disposed of in accordance with applicable regulations and standards.

It is also likely that some flaring will occur during commissioning and start-up. Shell Australia is investigating the type of flare system that will be installed.

4.7 LNG Facility Operation and Maintenance

Operation of the LNG asset over the life of the project will include:

- Operation of the LNG processing and loading facilities.
- Operation of electricity generation facilities.
- Operation of waste and wastewater management systems.
- Management of security.
- Management of traffic to and from the LNG facilities site.
- Dealing with unplanned events, for example, the late arrival of an LNG carrier or condensate tanker, interruptions to gas supply or an accident in the production sequence.
- Maintenance of the asset.
- Statutory inspection and turnaround activities.
- Corrosion management of the pipeline(s), including pigging operations.
- Management of the ship-shore interface in accordance with the agreed division of responsibilities between the port operator and the LNG operator.
- Export of LNG by dedicated LNG carriers (between three and five LNG carriers per week are anticipated). Plate 4.1 shows a typical LNG loading facility with berthed LNG carrier.
- Ensuring regular maintenance of LNG carriers takes place, in the case where LNG vessels are owned by the operator.

Shell Australia will operate the LNG facilities under an integrated control, safety and information management system designed for safe, reliable and efficient performance.



Plate 4.1 Typical LNG carrier at LNG loading facility (image provided by Sakhalin Energy Investment Company Ltd)

4.8 Decommissioning

Decommissioning will be addressed in the EIS. Decommissioning activities will include the removal and recycling (where practicable) of all above ground structures, with the site being remediated to applicable regulations and standards in force at that time. Contaminated land will be remediated to appropriate standards. Baseline surveys to establish any pre-existing site contamination will also be conducted prior to construction.

The gas pipeline will be decommissioned in accordance with Australian Standard 2885 and environmental policies, guidelines and regulations applicable at that time.

Planning for removal and remediation of facilities in the marine and intertidal environments will have regard to the extent to which the facilities provide habitat for marine flora and fauna, and their value as future conservation assets.

The dredged channels will not be reinstated as the resulting environmental impact would be greater than leaving the channel to reach a natural equilibrium.

4.9 Management of Occupational Health and Safety

Shell Australia is committed to maintaining high standards of Occupational Health and Safety in the workplace. This commitment is underpinned by Shell's global Health, Safety, Security and Environment (HSSE) Vision: 'No Harm to People. Protect the Environment'.

In support of this vision, all Shell businesses are expected to have a systematic approach to the management of HSSE and to adopt a HSSE Management System in line with Shell's global HSSE Control Framework, to enable them to meet Shell policies and standards and local legislative requirements. A HSSE Management System will be developed specifically for the project, based on Shell's HSSE Control Framework requirements. This HSSE Management System will apply to all Shell staff and operations and all contractors under Shell's operational control and will include, among other things:

- Company-wide HSSE standards and processes, including processes for reporting, audit and verification of performance.
- Comprehensive processes for the induction of staff and contractors to the project to ensure the ongoing development and maintenance of HSSE competence in the workforce.
- Stringent processes for the accreditation of contractors, requiring them to demonstrate that they have systems to discharge their obligations under Australian Occupational Health and Safety law.

Shell Australia's Health, Safety, Security and Environment commitment and policy is provided in Appendix 1.

For the LNG shipping aspects of this project, Shell Australia will draw on specialist support from STASCO. All Shell vessels operate to a safety management system which is approved under the requirements of the International Safety Management Code. As with oil shipping, the LNG shipping industry standards are monitored through the International Maritime Organisation regulations and Flag State control. Shell has an excellent safety record in LNG shipping with over 45 years operating experience without loss of cargo.

4.10 Project Schedule

Target dates for the project are provided in Table 4.1. This program shows the environmental approvals process commencing in June 2009 with project approvals being obtained in December 2010 to February 2011. It is anticipated the EIS would be submitted for formal public comment and government review in April 2010. The first LNG train is expected to be producing LNG in 2014 to 2015, with subsequent trains being brought into production according to market conditions.

Table 4.1 Proposed Development Program

Milestone	Target Milestone Date
IAS, significant project application and EPBC Act referral	June 2009
Final EIS terms of reference	August 2009
Baseline studies	June – October 2009
Final EIS submission	April 2010
Supplementary EIS	October 2010
Queensland Coordinator-General's evaluation report	December 2010
Commonwealth Minister for the Environment's assessment report	February 2011
First LNG production	2014 – 2015 [†]

[†] The start-up date for LNG production is dependent on obtaining environmental and planning approvals, capital works programs and CSG field development.