

QCLNG pipeline – The Narrows crossing

QGC and Australia Pacific LNG are developing coal seam gas (CSG) in central and southern Queensland for domestic and export markets.

QGC is the Australian subsidiary of BG Group, and is developing the Queensland Curtis LNG (QCLNG) Project. Australia Pacific LNG is a joint venture between Origin, ConocoPhillips and Sinopec.

This fact sheet focuses on the construction of the QCLNG and Australia Pacific LNG pipelines from the mainland across The Narrows – a section of Gladstone Harbour – to the Curtis Island liquefied natural gas plants. The QCLNG section is 12.7 kilometres long and Australia Pacific LNG 5.3 kilometres.

QCLNG and Australia Pacific LNG projects

The QCLNG and Australia Pacific LNG projects involve:

- The development and expansion of a number of CSG fields in central and southern Queensland
- LNG facilities on Curtis Island in Gladstone that will chill CSG into LNG
- Gas transmission pipelines connecting each CSG field with the LNG facilities.

QGC has agreed with Australia Pacific LNG to locate the pipelines for both projects in the same trench across The Narrows. This is consistent with the government's preferred approach. McConnell Dowell and Consolidated Contracting Company Joint Venture (MCJV) is constructing the two gas pipelines across The Narrows for both projects. QGC is project managing MCJV on the construction of the crossing pipelines.

Pipeline route

The pipelines are being constructed in the Queensland Government-declared Gladstone State Development Area.

The route for the pipelines crosses the Kangaroo Island Wetlands, The Narrows waterway and on to Curtis Island, south of Laird Point. The route is outside the Great Barrier Reef Marine Park boundaries and within the port limits of Gladstone.



The Narrows pipeline specifications

- QCLNG pipeline: 12.7 kilometres
- Australia Pacific LNG pipeline: 5.3 kilometres
- Diameter: 42 inches or 1.07 metres
- Pipe length: 12 metres
- Pipeline construction completion: 2013
- Operating life: 40 years

Pipeline construction

The pipelines are designed and constructed in accordance with Australian Standard 2885 (AS2885), which applies to high pressure hydrocarbon pipelines in Australia. The pipeline construction method was selected after extensive environmental and geotechnical studies of the terrain to minimise impacts. The conventional onshore method of construction and specialised techniques for wetlands and marine crossings are being used. For a description of the conventional onshore method please refer to QGC's QCLNG pipeline Fact Sheet.

The construction techniques have been adapted to the various terrains and divided into five sections explained on the next page.

Temporary infrastructure

Temporary infrastructure is being constructed to enable access to and between the creek, marshland and The Narrows sections. The temporary infrastructure being established includes:

- **Temporary road and rail tracks:** These will allow transportation of construction equipment and materials to support the installation of the pipelines within the easement. Twin rail tracks will run for three kilometres.
- **Humpy Creek and Targinnie Creek bridges:** These will allow temporary access over the creeks.
- **Cofferdam/Jetty:** 1,600 meters of sheet-piled trenching will be constructed to act as a stabilised trench within the tidal area of the marshland. A cofferdam and jetty will also be constructed on Curtis Island to enable connection of the pipelines across the channel to the island.
- **Winch pad:** A temporary 450 tonne winch pad will be installed on Curtis Island to pull the pipelines across The Narrows.

Other temporary infrastructure that will be built to support construction of the pipelines will include pipe laydown areas, temporary offices and internal access roads at Phillipias Landing Road and Curtis Island. Once the pipelines have been completed, all of the temporary infrastructure will be removed.

Horizontal Directional Drilling (HDD)

The HDD technique is being used on the creek section of The Narrows crossing. The technique has been used extensively in laying pipelines and other similar infrastructure around the world, it reduces the need to dig open-cut trenches.

The HDD technique process generally involves three stages. The first stage involves drilling a pilot hole for each pipeline. The second stage involves enlarging the hole by passing a larger cutting tool known as the reamer. The third stage involves pulling the welded pipelines into place in the creek section.



Dredging

The 2.3 kilometre marine crossing will require dredging to install the pipeline under The Narrows channel.

In comparison with other dredging activities occurring in the Port of Gladstone, material to be excavated for the marine crossing is equivalent to about one percent of the total material being excavated for the broader harbour dredging program.

The trench for the marine crossing will be dug by a backhoe excavator dredger working off a barge. The material excavated from the trench will be disposed of in accordance with environmental conditions applied by state and federal environment departments.

Pipe pull

The 'pipe pull' is one of the most complex and innovative stages of the construction process. To cross the marshland and The Narrows channel, the individual concrete-coated pipe lengths will be welded together to form sections – called 'strings' – of pipe about four kilometres long. These strings will initially be winched through the flooded marshland cofferdam while attached to floats. As the pipe string moves above the start of the dredged trench the floats are removed and pipe is pulled along the bottom of the trench to Curtis Island. It is envisaged that there will be limited access to The Narrows and the surrounding waterway during the pipe pull for about 48 to 72 hours. Weather and other events outside the project's control may have an impact on how long access to The Narrows waterway is restricted.

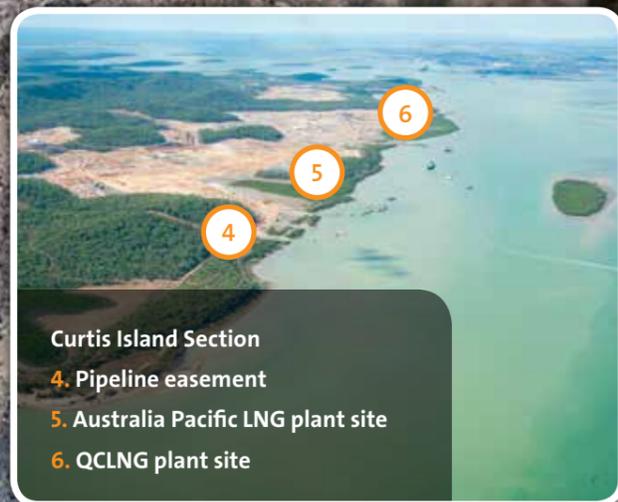
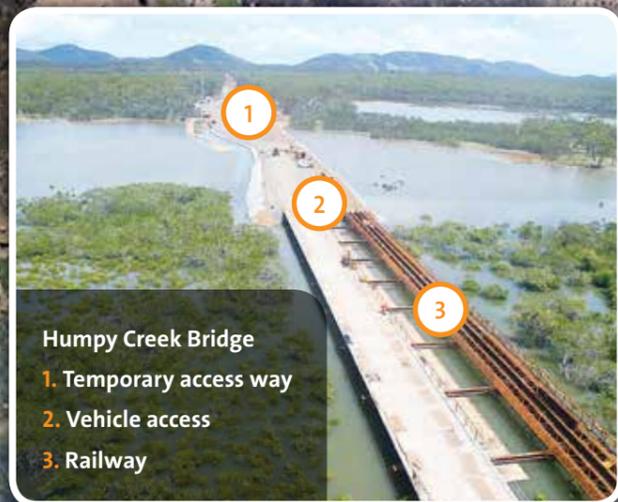
Backfill

Pipelines installed through the marshland and across The Narrows are coated with concrete for protection and stability.

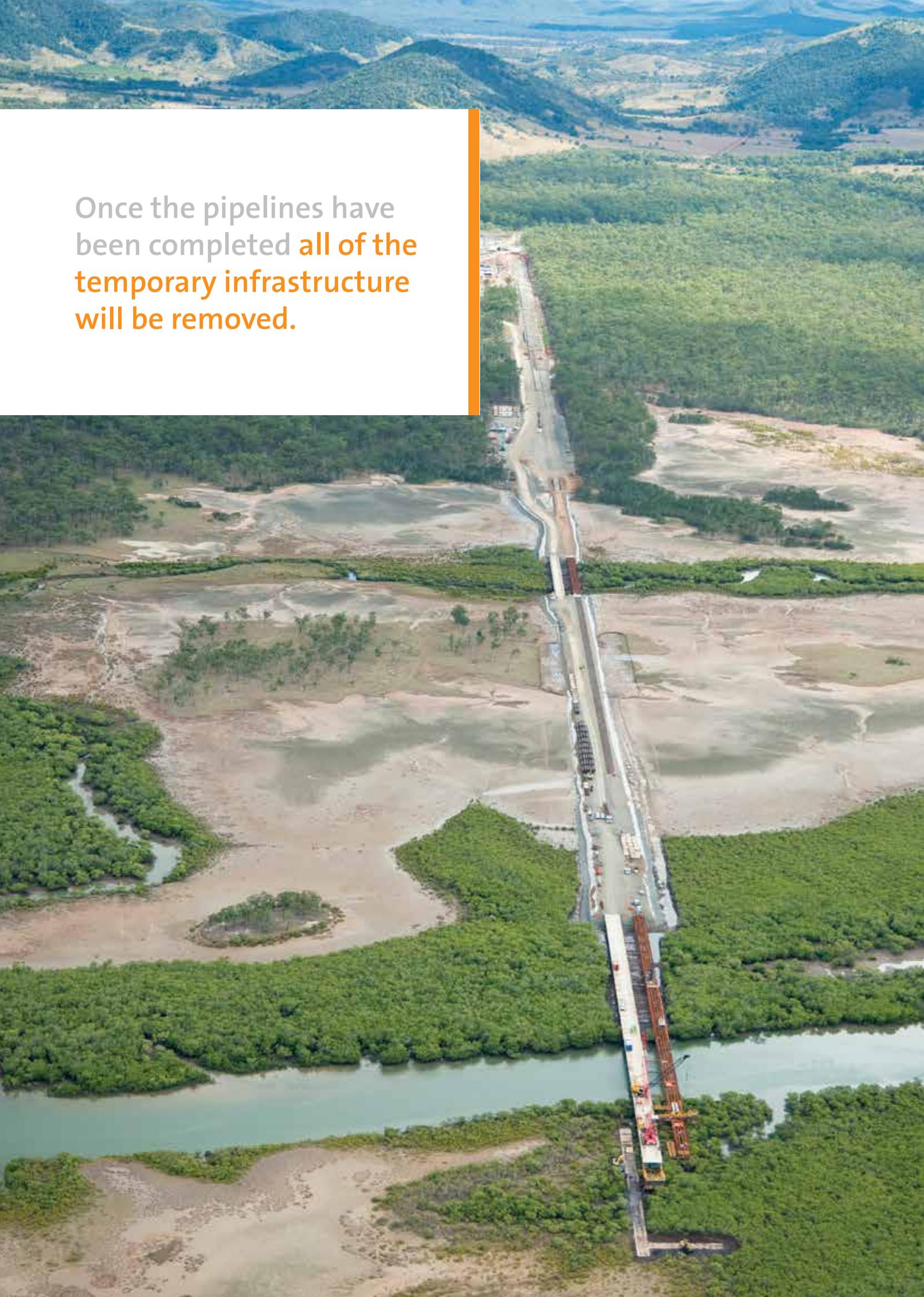
The pipelines in the dredged trench will be buried under rock backfill for protection. The pipelines installed on the mainland and on Curtis Island will be backfilled using the conventional onshore construction method (please refer to the QCLNG pipeline Fact Sheet).

Bird's eye view of The Narrows crossing

	Phillipies Landing Road (2.0 km)	Creek section (1.4 km)	Marshland section (1.6 km)	The Narrows crossing section (2.3 km)	Curtis Island section (5.4 km)
Timeframe 2011-13	QCLNG pipeline	QCLNG and Australia Pacific LNG pipelines	QCLNG and Australia Pacific LNG pipelines	QCLNG and Australia Pacific LNG pipeline	QCLNG pipeline
Construction activities	Pipeline to be constructed by conventional onshore construction method.	Pipelines to be installed using horizontal directional drilling.	Pipelines to be pushed into cofferdam – a temporary watertight enclosure creating a dry work environment.	Pipelines to be pulled into dredged trench and backfilled with rock.	Pipelines will be pulled through The Narrows section to Curtis Island by winch. The conventional onshore construction method will be used to construct the pipeline on the island.
Temporary infrastructure	<ul style="list-style-type: none"> • Pipe lay-down area • Site office • Access tracks 	<ul style="list-style-type: none"> • Temporary access ways (road/rail) • Humpy Creek bridge • Targinnie Creek bridge 	<ul style="list-style-type: none"> • Temporary access ways (road/rail) • Cofferdam 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Pipe lay-down area • Site office • Access tracks • Winch • Jetty • Cofferdam
Depth of cover	1.2 m	30 m	4.5 m to 5 m	Up to 1.5 m	1.2 m



Once the pipelines have been completed **all of the temporary infrastructure will be removed.**



Government regulations require The Narrows crossing to comply with stringent environmental regulations outlined in 21 Environmental Management Plans, 20 permits and more than 600 conditions.



Environmental management

Environmental assessment of the QCLNG and Australia Pacific LNG projects was done under federal and state legislation. A pre-construction environmental impact assessment for The Narrows comprised extensive geotechnical studies including surface and subsurface exploration of the proposed site.

The environmental authorisations issued by regulators requires the following techniques and mechanisms to minimise the impact on the environment during and after construction:

- **Fauna management:** Significant research has been conducted into habitat and behaviour of the water mouse and shore birds on Friend Point and in the Marshlands.
- **Acid sulfate soils:** The acid sulfate soils are managed in accordance with the Acid Sulfate Management Plan for the project that is aligned with Queensland Acid Sulfate Soils Investigation Team guidelines. These have been approved by the State Government. Specially designed treatment pads have been constructed at the Phillipies Landing Road section. Once excavated soil is placed into the treatment pads, it is treated with a measured volume of lime to neutralise the potential chemical reaction and a final verification test is done to ensure any potential acid-generating material has been neutralised. Some treated material may form part of the backfill and any excess material will be disposed of in accordance with government regulations.
- **Water monitoring:** Monitoring of water quality in The Port of Gladstone occurs continuously at 16 sites. Measurements of turbidity and salinity are taken every 15 minutes. QGC will also use a state-of-the-art protective monitoring framework for seagrass in the Gladstone Harbour. This method measures the availability of sunlight for seagrass rather than an alternative approach which measures the turbidity of the water.
- **Erosion and sediment management:** All erosion and sediment management plans are approved by a certified practitioner. These plans ensure best-practice erosion and sediment control systems are used.
- **Mangrove management:** Temporary bridges at Humpy and Targinnie Creeks have been installed to reduce the impact on mangroves during construction and to assist revegetation after construction.

About QGC

QGC is a leading Australian coal seam gas explorer and producer focused on developing reserves in both the Surat and Bowen basins for domestic and international supply.

Our headquarters are in Brisbane and we employ more than 7,300 people across Queensland. In 2011, QGC produced about 20% of Queensland's gas demand.

QGC is wholly owned by BG Group, a leading oil and gas company with headquarters in the United Kingdom and operations in more than 25 countries.

Our commitments

We seek to minimise the effects of our operations on landholders and make a positive contribution to the protection of the environment.

We run our business in accordance with all government regulations, industry standards and the access rules that we agree with landholders.

Our staff, contractors and consultants follow QGC's Code of Conduct, outlined in the 'Information for Landholders' booklet and available at our website: www.qgc.com.au

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