

Across the water

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Crossings of natural waterways have traditionally always been challenging sections in onshore pipeline routes.

The primary objective is to ensure that the pipeline section at a waterway crossing will maintain its integrity during the operational lifetime of the entire pipeline system.

It is also important to care for the natural environment.

The challenges are usually caused by the following site conditions:

- » Geology;
- » Water flow; and,
- » Environmental sensitivity.

The geology along natural waterways can be complex.

In some cases, a natural waterway has been formed along an ancient geologically active zone, such as a fault line.

This is likely to result in different geotechnical conditions at each of the banks, with an unstable geotechnical zone in between.

In addition, eroded rock material from upstream areas have been transported by the flow of the water, and been deposited along the bed and banks of the waterway over time.

This can result in thick layers or lenses of gravel and cobble deposits.

The water which flows through the waterway can be peaceful at times, but catastrophic during extreme weather events.

The latter can be the pipeline operator's worst enemy, with potentially devastating consequences for pipeline integrity, affecting the reliability of the entire pipeline system.



Santos GLNG Project – Narrows Crossing Pipeline Alignment

Eroding riverbeds, sometimes to several metres in depth, are common during extreme events; river banks are also often subject to collapse and erosion.

Natural waterways and their surroundings are almost always pristine environmental habitats for flora and fauna.

Legislation requires that due care is applied in Australia when planning, designing, building and operating pipelines across these areas.

An example is the crossing of the 42-inch main gas transmission pipeline with The Narrows in Gladstone, Queensland, part of the Santos GLNG Project.

The front-end engineering design, conducted by Atteris Pty Ltd, resulted in selecting a concept based on a 4.4 km long segmentally lined concrete tunnel to house the pipeline.

The design was chosen for its cost-effectiveness, low-impact, high integrity, and

low project and environmental risk for this challenging section of the pipeline route.

The detailed design was undertaken by GLNG's EPC contractor with input from GLNG and Atteris as owner's engineers.

The construction phase was successfully completed in the second quarter of 2014 and ahead of schedule.

For smaller pipeline diameters, APA Group is currently also using the engineering expertise of Atteris for several river crossings in Queensland.

All solutions developed by Atteris are unique for each site due to the variations in site conditions.

Recognising the challenges in waterway crossings and shoreline crossings, Atteris also leads a Joint Industry Project, funded by Energy Pipelines CRC, Woodside and Chevron Australia, to develop an Engineering Guideline for these challenging areas in pipeline routes. **P**

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