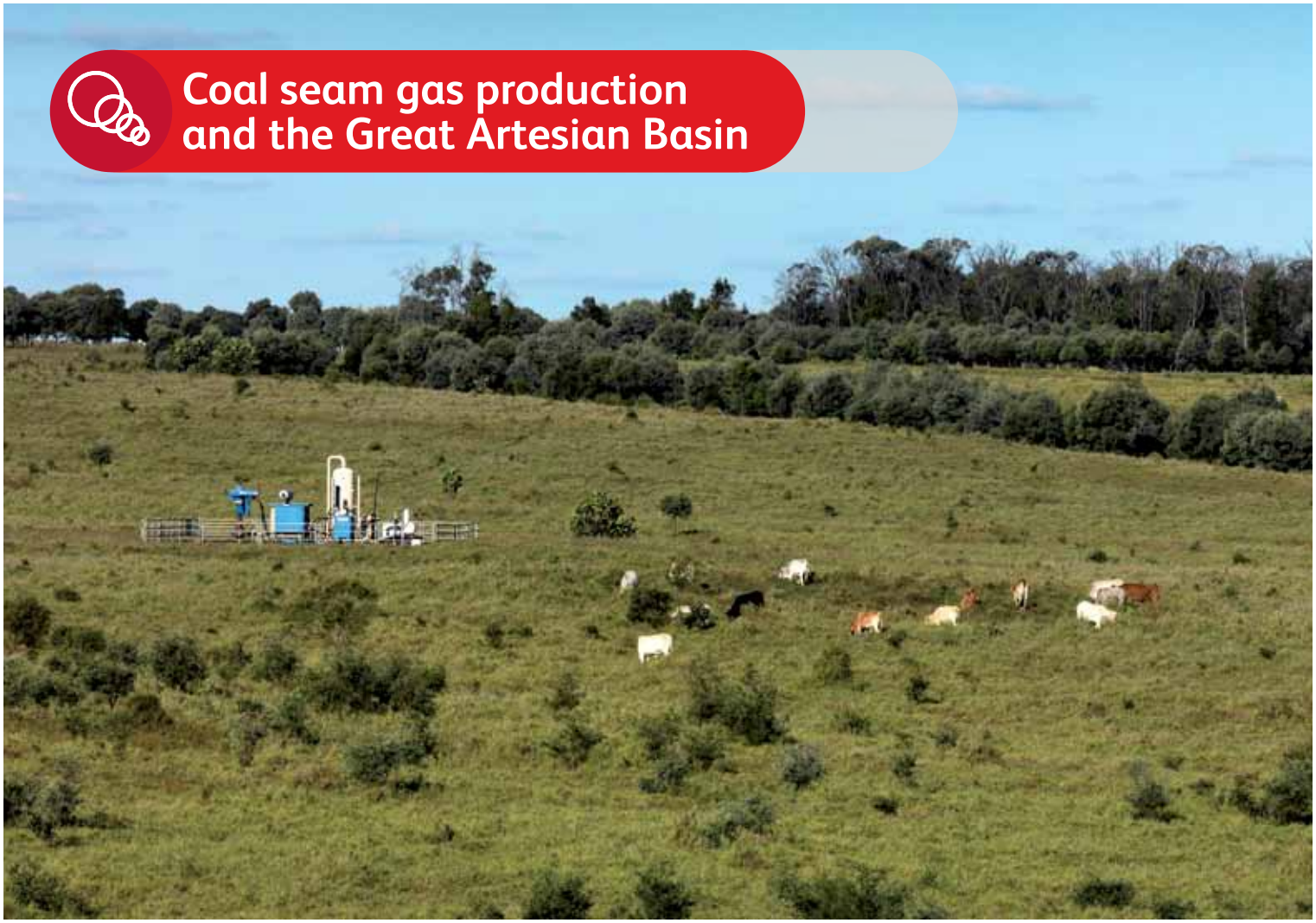
Coal seam gas production and the Great Artesian Basin



Australia Pacific LNG Project

Australia Pacific LNG is the leading coal seam gas (CSG) producer in the Queensland natural gas industry. The joint venture between Origin, ConocoPhillips and Sinopec is currently undertaking a major CSG to liquefied natural gas (LNG) project that will supply natural gas to both the domestic and international markets. The Australia Pacific LNG Project involves developing CSG fields in the Surat and Bowen Basins, construction of a 520 km pipeline and a new LNG facility on Curtis Island, off shore from Gladstone.

CSG is a cleaner and greener alternative to many currently used fossil fuels, such as coal and petroleum. Power stations fired by CSG emit around half the greenhouse gases of coal-fired electricity generation and use only a fraction of the water. CSG is emerging as a preferred transition energy source as the world develops its renewable energy capacity. The CSG industry is set to provide Queensland and Australia with huge economic benefits.

Recent advances in technology have meant that large scale extraction of CSG from the Surat Basin in Queensland is now a viable commercial prospect. Over the past few years multiple major CSG to LNG projects have gained approval.

Some members of the community are concerned about the impacts of CSG production on the Great Artesian Basin (GAB).

What is the Great Artesian Basin?

The GAB is one of the largest artesian groundwater basins in the world. It lies under more than 1.7 million square kilometres of Queensland, northern New South Wales, Northern Territory and South Australia. This area is equivalent to approximately 22% of Australia's land mass.

The Surat Basin and Bowen Basin's are sub-basins of the GAB.

The GAB comprises many different geological layers including sandstone, mudstone and siltstone, one on top of the other. Some of the layers, such as sandstones, are permeable and allow water to flow through them, these are called aquifers. The other layers, including mudstones and siltstones are relatively impermeable and do not allow water to pass through them freely, these are called aquitards. Aquifers are the layers that people tap with bores to access groundwater.

AUSTRALIA PACIFIC LNG

origin | ConocoPhillips

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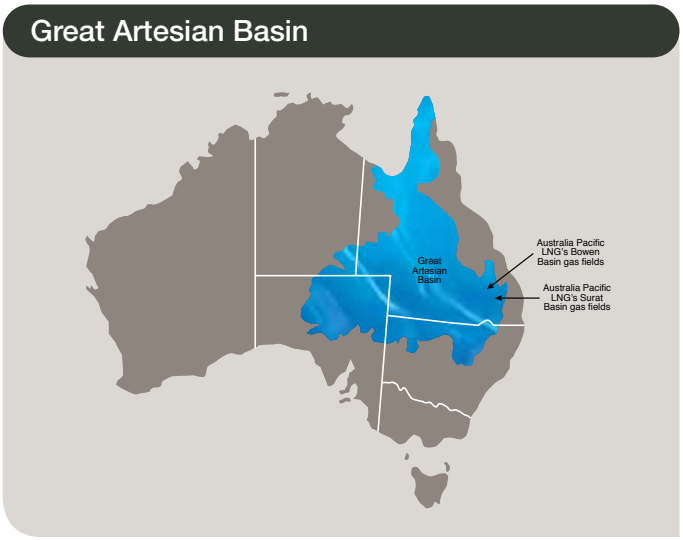
Great Artesian Basin



Groundwater from the GAB is generally suitable for livestock or industrial uses, and less commonly of a quality suitable for human consumption or irrigation due to its high salt content.

GAB aquifers naturally refill at the edges of the basin where areas of sandstones are exposed, as rain falls or streams flow over these rocks the water soaks through and enters the system. This is called natural recharge. In Queensland, natural recharge takes place mainly on the eastern side of the Basin along the Great Dividing Range. Although permeable, the water flow in aquifers is very slow and it generally travels at a rate of between 1 and 5 metres per year under natural conditions.

GAB aquifers are not flat. They are bowl shaped and dip in the middle. They are also capped or sealed by impermeable aquitards. This means that water is stored in this basin shape, deeper at the basin base and much shallower at the edges. The water at the lowest point of the basin is stored under pressure. The higher the water level, ie the higher the water reaches up the side of the basin, the more pressure there is. As a result of this water pressure, water rises towards the ground surface when the aquifer is tapped by a bore. If the water in a bore reaches the surface unassisted, this is called an artesian or flowing bore. If the water needs to be pumped to the surface this is called a sub-artesian bore. In the area of Australia Pacific LNG's operations most bores are sub-artesian and require pumps to draw water to the surface.

Water naturally discharges from GAB aquifers at springs, these springs are concentrated in the south and west of the GAB, hundreds of kilometres from Australia Pacific LNG's operations. However, the major discharge from the GAB is from bores, either in flowing bores, or from pumped bores where water pressure is sub-artesian.

Small deposits of coal are commonly found in many of the geological layers that make up the GAB. Many thin coal seams have been discovered in the Walloon Coal Measures within the Surat Basin. It is these geological layers that are accessed to produce CSG.

CSG production relies on the extraction of water in coal seams to depressurise the coal measures allowing natural gas to flow.

Will coal seam gas production drain the Great Artesian Basin?

It is estimated that the GAB has a total storage capacity of 64,900 million megalitres (a megalitre, or ML, is a million litres). This is a massive amount of water - equivalent to 130,000 Sydney Harbours in volume. Each year it is naturally recharged by 912,120 ML and there is an estimated natural discharge of 47,450 ML.

Current modelling estimates show the combined average water production for the total CSG industry at around 75,000 ML per year (or equivalent to 0.15 Sydney Harbours), with a peak of less than 140,000 ML per year. However industry experience operating in the Bowen and Surat Basins for the last ten years indicates that water production rates are likely to be less than predicted by computer modelling.

Compared to the total storage capacity of the GAB, the amount of water projected to be extracted during CSG production is very small. At the peak of water production the annual water extraction is likely to be less than 0.0002% of total storage. This is the equivalent of taking approximately 5 litres out of an Olympic sized swimming pool.

It is clear that the CSG industry will not drain the GAB and will have negligible impact on total storage volumes.

Will coal seam gas production drain aquifers?

CSG production does not involve extraction of water from commonly used aquifers. Water is only extracted from the coal measures. The coal measures are generally located hundreds of metres below the commonly used aquifers.

The Bungil, Mooga and Gubberamunda aquifers, known in some areas as the Kumbarilla Beds, are the most commonly used aquifers in the Surat region. The aquifers are generally located at depths between 50 and 250 metres, much shallower than the gas producing coal measures. Some feedlot and industrial bores access the Hutton and Precipice aquifers, which generally sit at depths between 500 and 1,000 metres, deeper than the coal measures.

There are many low permeability aquitards of significant thicknesses that separate the coal measures from the most commonly used groundwater supply aquifers. One example is the Westbourne Formation which is up to 250 metres thick in some places.

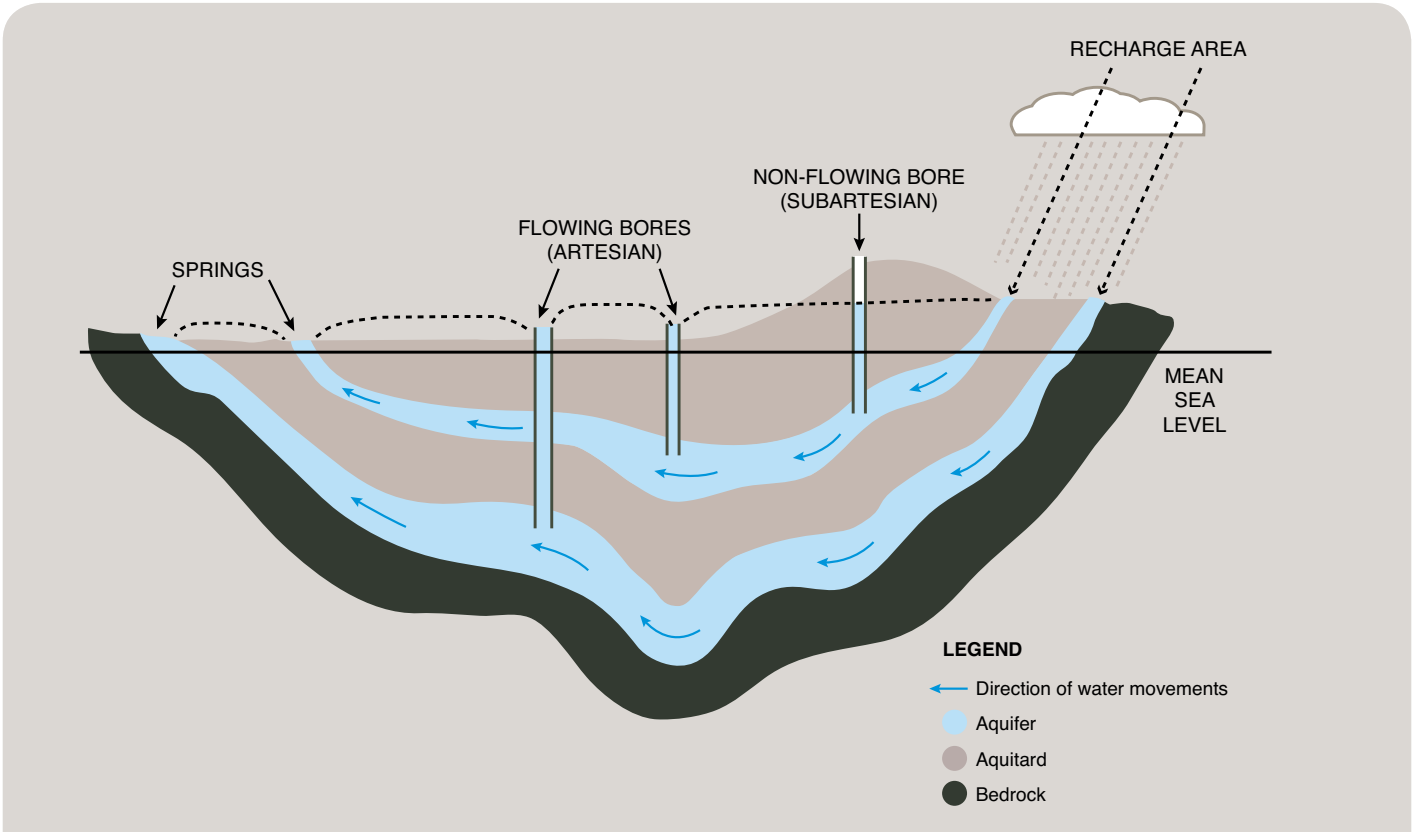
These aquitards create a high level of natural isolation between the coal measures and the commonly used aquifers. This means that there is limited potential for activity in one layer to directly impact the other. Although some localised impacts may be observed, removing large amounts of water from the coal measures will not result in large reductions in water levels in other aquifers.

In some cases landholders access the Walloon Coal Measures for groundwater supply. Where this happens close to proposed CSG operations, it is likely that bore production rates will be impacted by CSG production. In these instances it is the legal responsibility of the CSG operator to make good, or offset, any impacts. Australia Pacific LNG will work closely with these potentially impacted landholders to negotiate the best way to make good any impacts to these groundwater supplies.

Australia Pacific LNG is committed to expertly managing any impacts on groundwater from CSG production.

Comparison of water removal from the Great Artesian Basin

European settlers first discovered the groundwater potential of the GAB in 1878. It is estimated that the total amount of water extracted from the GAB since that time is 57,125,000 ML, less than 0.1% of the total storage capacity.



Simplified image of water flow through aquifers

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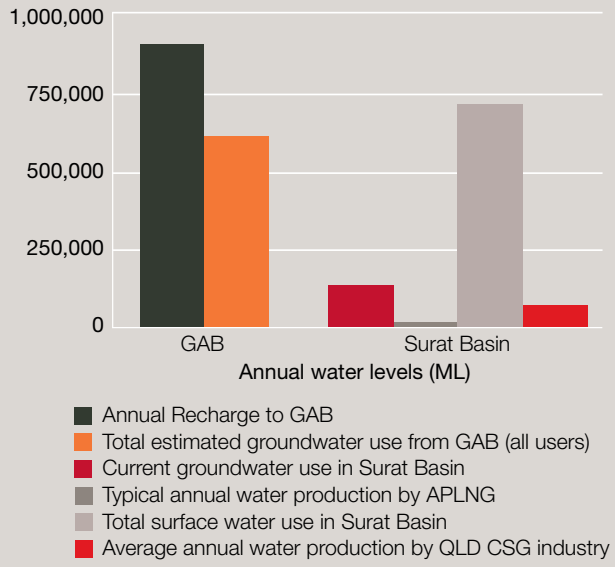
It is estimated that 616,166 ML of water (less than 0.001% of total storage capacity) is currently extracted from the GAB by landholders, farmers, agriculturalists, industry and for urban use each year. The current usage figure for the Queensland portion of the Surat Basin is estimated to be 140,000 ML per year.

The Australia Pacific LNG project will typically produce water at the annual rate of 25,000 ML per year, with a peak of 57,000ML per year. This water is extracted from the coal formations and not the commonly used water supply aquifers.

Total average water production for the CSG industry is estimated to be 75,000 ML per year, with a peak of less than 140,000 ML per year.

Annual GAB and Surat Basin water figures



Summary

- The CSG industry will not 'drain' the GAB, overall CSG water extraction will have negligible impact on total GAB storage volumes.
- The CSG industry's water extraction is minor compared to current and historic GAB extraction and less than, or comparable to, many existing industries in the Surat Basin.
- CSG production in Australia Pacific LNG's project area does not extract water from commonly used aquifers. Water is removed from the coal measures, a geological layer that is not heavily used for water supply.
- Australia Pacific LNG is committed to 'making good' any localised impacts to existing water users in accordance with the Water Act (2000).

Got a question about Australia Pacific LNG?

For enquiries about the gas fields or pipeline call 1800 526 369 or email contact@aplng.com.au

For enquiries about the Gladstone operations and LNG facility call 1300 776 205 or email aplng.gladstone@conocophillips.com

Or visit our website at www.aplng.com.au

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