

# Managing impacts of CSG extraction on underground water in the Great Artesian Basin

The Great Artesian Basin (GAB) has been studied for many years, with knowledge about the basin documented in a range of scientific papers and reports. Collectively these describe the rock layers, the quality of the water contained in various aquifers and how water moves through them. This information has informed the Queensland Government's regulatory framework which has been implemented to manage the potential impacts on the GAB as a result of coal seam gas (CSG) water extraction.

To further expand on this knowledge, the Queensland Government is also undertaking the CSG Water Feasibility Study which is investigating the potential impacts of CSG extraction on groundwater resources. This project has been funded by the Commonwealth Government's Water for the Future initiative.

## Managing impacts on the Walloon Coal Seam Measures and the Condamine Alluvium

The Walloon Coal Measures is the main gas producing formation targeted for CSG extraction in the GAB. There are other coal formations where CSG activities will be operating but these are in different geological basins that are not part of the GAB.

The Walloon Coal Measures are not a major aquifer of the GAB. Connectivity of Walloon Coal Measures with underlying and overlying aquifers varies depending upon the thickness and permeability of the separating formation material.

Shallow alluvial aquifers, such as the Condamine Alluvium, sit on top of the Great Artesian basin. There is the potential for interconnectivity between parts of the Condamine Alluvium and the underlying Walloon Coal Measures. Again the degree of connectivity will vary depending upon the separating formation material and depth.

Current information indicates that any interconnectivity with the Walloon Coal Measures is unlikely to have a significant impact on the viability of the Condamine Alluvium as a whole, including water level and water quality considerations.

There may however be some localised impacts on water bores in the Condamine Alluvium.

## Managing impacts on landholders' groundwater

The Queensland Government has introduced legislative amendments, which commenced in December 2010, to ensure that groundwater resources are adequately protected and managed into the future. These legislative amendments saw the transfer of management of groundwater associated with CSG production from the agencies that regulate industry development to the Department of Environment and Resource Management (DERM) which is responsible for monitoring and regulating impacts on the environment.

These amendments rationalise and enhance existing management arrangements, including provisions for protection of new bores that are drilled after a tenure is granted.

Trigger thresholds will be used to help determine the area where water bore levels are predicted to decline.

The trigger thresholds are:

- A five metre reduction in water level for consolidated aquifers such as sandstone
- A two metre reduction in water level for unconsolidated aquifers such as shallow alluvial aquifers.

CSG tenure holders may have to undertake groundwater modelling to determine if the projected decline in groundwater levels (associated with CSG production) exceeds the trigger threshold. If a water supply bore is likely to have an impaired capacity because of decline in water level, the tenure holder must negotiate a make good agreement with the bore owner.

The arrangements to make good an impact may include:

- lowering the pump setting in the bore to increase the water level above the pump
- improving the pressure at the bore head, including new headwork and piping if the affected supply is artesian
- changing the pump to one that is better suited to the decreased water level in the bore
- deepening the bore to allow it to tap a deeper part of the aquifer
- reconditioning of the water bore to improve its hydraulic efficiency
- drilling a new bore
- providing an alternate water supply.

In areas where multiple CSG producers may have an overlapping impact on groundwater resources, DERM may declare the region a cumulative management area (CMA).

Management of groundwater impacts from CSG water extraction in a CMA will be managed by an independent authority, the Queensland Water Commission (QWC). The Commission will be responsible for managing numerous activities to protect landholders' groundwater supplies. This includes groundwater impact modelling and the preparation of underground water impact reports.

CSG producers will still be responsible for negotiating make good agreements with landholders.

### **What is adaptive management?**

Adaptive management frameworks are widely used when there are potential unknown and unintended impacts which could influence important management decisions. Such a framework is being used to ensure environmental values and groundwater resources are adequately protected and managed into the future.

The management framework will be based on adaptive management principles that will allow changes to ensure the environment and groundwater is protected as more information about on-ground conditions becomes available.

This is important because:

- groundwater systems (particularly sandstone aquifers as found in the Great Artesian Basin) respond slowly to changes caused by pumping. Sufficient time needs to be allowed so that management practices may be altered if monitoring shows that groundwater changes are not proceeding as projected by the model
- progressive development of CSG operations over a number of years will allow for further assessment of the cumulative impact to be undertaken – as more CSG wells commence production
- if monitoring indicates that groundwater changes are not proceeding as projected by the modelling, then management measures may be implemented until the risk can be adequately addressed
- adaptive management requires detailed monitoring to be undertaken to evaluate performance of management measures implemented. The new legislative framework regulating groundwater impacts will apply to existing as well as proposed CSG projects.

Management measures such as slowing, modifying or halting development can be implemented until the risk can be adequately addressed.

### **The scientific research undertaken before approvals are granted**

Large scale CSG projects are required to go through an Environmental Impact Statement process. In circumstances where the project is declared a significant project by the Coordinator-General, companies may be asked to produce detailed groundwater modelling studies to determine potential groundwater impacts from their proposed activities. These studies would be reviewed by the Coordinator-General with advice being provided by DERM. If the Coordinator-General is not satisfied with the modelling provided he has the power to require companies to undertake further studies.

Of the Coordinator-General reports issued to date, conditions have been included requiring companies to:

- develop and implement an extensive groundwater monitoring network delivering an enhanced baseline dataset prior to the commencement of CSG activities
- revising and recalibrating the modelling based on the monitoring data that is gathered to predict and identifying the impacts to both environmental values and users of the water resources.

### **More Information**

- Call the CSG/LNG Hotline 13 2523
- Visit [www.lng.industry.qld.gov.au](http://www.lng.industry.qld.gov.au)