GISERA
Gas Industry Social and Environmental Research Alliance

OCTOBER 2018
WATER RESEARCH FACTSHEET

Groundwater characteristics in the Beetaloo Sub-basin

This project will sample and analyse groundwater in the Beetaloo Sub-basin, creating a set of baseline data against which potential impacts caused by the gas industry can be measured.

Community concerns

The recent Scientific Inquiry into Hydraulic Fracturing in the Northern Territory highlighted community concerns about the potential of the onshore gas industry to affect the quality and quantity of groundwater. Groundwater is important for agriculture, tourism, and community water supplies.

The inquiry also highlighted a lack of baseline data for aquifers in the Beetaloo Sub-basin. Without baseline data, any potential impacts from gas exploration are more difficult to quantify.

The inquiry final report recommends that '*before any further production approvals are granted,' a regional water assessment with a focus on surface and groundwater quality and quantity (recharge and flow) be conducted for any prospective shale gas basin, commencing with the Beetaloo Sub basin*'.

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies south-east of Katherine, spanning an area of about 30,000 square kilometres. One of the most prospective areas for shale gas in Australia, it contains an estimated prospective resource of 178,200 petajoules (PJ) of gas.

The Cambrian Limestone Aquifer system is the major aquifer in the Wiso, Georgina and Daly basins among which the Beetaloo Sub-basin is situated (Figure 1, overleaf).

Objectives of this project

This project will provide the community and regulators with information on the baseline concentrations of various compounds in the groundwater of important aquifers in the Beetaloo Sub-basin. The outcomes will also be useful to the NT Government in developing water allocation plans should exploration or development go ahead. This is the first stage of a larger project that will improve understanding of the groundwater system of the Beetaloo Sub-basin.

KEY POINTS

- Communities in the Northern Territory are concerned that the onshore gas industry could affect the quality and quantity of groundwater.
- The Scientific Inquiry into Hydraulic Fracturing in the Northern Territory has recommended a regional water assessment, starting with the Beetaloo Sub-basin.
- Baseline data characterising groundwater in the basin is lacking.
- This project will develop baseline data for the area, sampling groundwater from several bores.
- The project will assess groundwater quality, and estimate groundwater recharge, flow rates and age. The results will be reported in detail to the public.

Water is an important resource.

What is the project timeline?

3 October 2018 – 30 June 2019

When will the results be available?

The samples will be collected in October and November 2018.

The water quality assessment will be complete by February 2019.

The tracer study will be complete by June 2019.

Who is funding this project?

The project is co-funded by the Australian Government, the NT Government, the CSIRO and by Origin Energy and Santos.

What the project will do

Groundwater samples from up to 25 bores in the area will be collected. Important characteristics of the samples will be measured and this data will then be analysed to:

- assess groundwater quality
- estimate groundwater recharge, flow rates and age.

The results will be publicly available when the project is completed. This project will also help the NT Government identify suitable locations for its proposed observation wells to help characterise the Cambrian Limestone Aquifer.

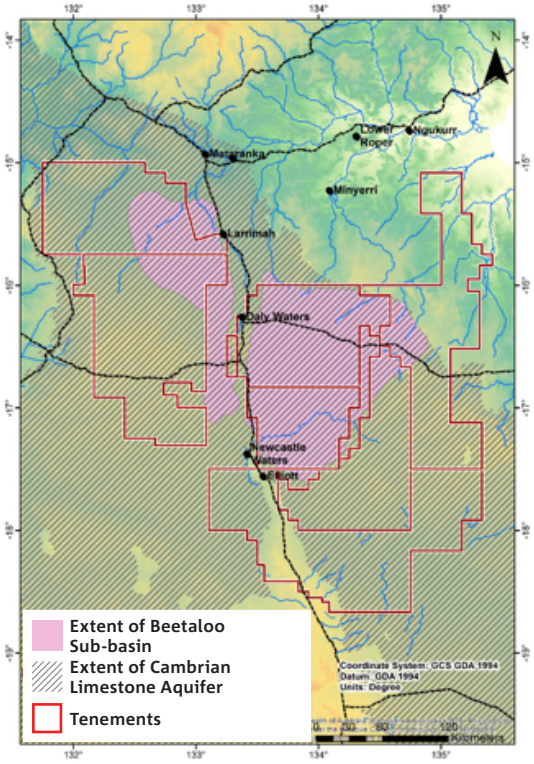

Figure 1. Map of Cambrian Limestone Aquifers (the major aquifer in the Wiso, Georgina and Daly basins) showing the Beetaloo Sub-basin.

More information

Find out more about the project

Inquiry final report

About the Beetaloo Sub-basin

Collecting groundwater samples from bores

During October and November 2018, researchers will collect groundwater samples from about 25 bores in the area. Bore locations and access will be decided in consultation with the NT Government and landholders, with assistance from gas industry teams on the ground. Bores outside the current tenements may be sampled.

Bores that intersect the Cambrian Limestone Aquifer will be sampled to evaluate the groundwater flow velocity and recharge rate and also the source of recharge.

Assessing groundwater quality

Using the groundwater samples collected, researchers will examine the physical chemistry of the water and measure water quality parameters such as dissolved methane, methane isotopes, alkalinity, metals, hydrocarbons, phenols, radiation, and BTEXN (benzene, toluene, ethylbenzene, xylenes and naphthalene).

The data will be analysed to:

- assess water levels, flow directions and, where possible, flow rates
- characterise the physical chemistry of the water
- develop profiles of dissolved methane concentration
- establish baseline levels of water quality parameters (e.g. pH, temperature, conductivity, dissolved oxygen)
- determine any exceedances of relevant guidelines.

The concentrations of various chemical constituents present in the water samples will be reported in detail and made available to the public.

Estimating groundwater recharge, flow velocity and age

Groundwater samples will be analysed for a range of naturally occurring environmental tracers to determine the age of groundwater and the recharge sources. Variations in recharge rates, recharge mechanisms, and groundwater flow directions in the Cambrian Limestone Aquifer will be evaluated. Likely pathways for water recharge and potential pathways for groundwater connection between different aquifers in the Beetaloo Sub-basin will also be identified. The age distribution and the flow dynamics of the aquifer will be incorporated into groundwater models for the area.

Because the success of the tracer approach requires as many samples as possible, existing tracer information will also be used, including from the Geoscience Australia 'Exploring for the Future' program.

Chemical data for rain events will be acquired, possibly from a site at Katherine or within the survey area.

The concentrations / isotopic ratios of the various environmental tracers present in the water samples will be reported in detail and made available to the public.

What are environmental tracers?

Some compounds that occur naturally in groundwater can be used to determine the origin and age of groundwater because their concentrations vary in a predictable way over time.

Environmental 'tracers' such as tritium, sulfur hexafluoride, chlorofluorocarbons, carbon-14 and helium are commonly used to identify the presence of groundwater that is 'young' (>50 years), 'old' (1000 – 10,000 years), or 'very old' (>20,000 years). The concentrations of these tracers are in parts per billion, occur naturally in groundwater and pose no human health risk.

Variations in noble gas concentrations in groundwater can be used to infer how much rainwater is recharging the aquifer and where that water is entering the aquifer.

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