



GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

Potential environmental impacts of shale gas related wastewater disposal options

This CSIRO research project will review options for the management and treatment of wastewater associated with shale gas production and assess their potential for environmental harm.

Key points

- Shale gas development involves the use and production of water – primarily for drilling and hydraulic fracturing.
- Wastewater management, including the potential for environmental impacts, is an issue of concern to communities in the Beetaloo.
- This project will build on a previous GISERA study into wastewater management approaches.
- Researchers will assess wastewater management, treatment and disposal options, including wastewater reinjection into deep formations, and consider their potential for environmental harm.
- A significant component of the project will look at approaches to reduce the volume of wastewater and waste to be managed.

This project, conducted through CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA), will focus on wastewater derived from drilling, hydraulic fracturing and flowback activities associated with shale gas development. Researchers will assess the potential for environmental harm from a range of wastewater management and treatment options, and will explore options to reduce the volume of wastewater and waste to be managed.

The project will place an emphasis on evaluating the potential impacts of the reinjection of wastewater into deep formations – an option not considered in previous GISERA research.

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies southeast of Katherine in the Northern Territory and spans approximately 30,000 square kilometres.

The estimated gas resources for the Beetaloo sub-basin are of similar size to other major gas producing basins in Australia, such as the Surat Basin in Queensland and the Bonaparte/Browse basins in Western Australia.

Shale gas development involves the production of wastewater from three main sources: drilling fluids, flowback fluid, and produced water.

The management and disposal of this wastewater, and the potential for it to cause environmental damage if not managed properly, remains an issue of concern for communities in the Beetaloo region.

While there have been previous studies that have considered wastewater management options at a high level, including by GISERA, there is still uncertainty about the risks posed by various approaches in the Beetaloo. This project will address that knowledge gap.



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Project objectives

This project will provide further information on the strengths and weaknesses of water and wastewater management options for the shale gas industry in the Northern Territory. The project outcomes may be used by decision makers to inform policy choices.

Unlike previous studies, this project will consider wastewater reinjection. Wastewater reinjection is used elsewhere in Australia, including Queensland and South Australia, but is currently prohibited in the Northern Territory in response to a recommendation from the Independent Scientific Inquiry into Hydraulic Fracturing in the Northern Territory.

This recommendation was based on the uncertainty around potential impacts, and indicated that wastewater reinjection may be permitted if the risks could be managed.

The aims of this study are to:

- develop a set of scenarios for the management of water and wastewater associated with shale gas development in the Beetaloo region.
- review the current literature on the environmental risks associated with wastewater reinjection
- assess the potential environmental impacts of these scenarios, and how these impacts can be mitigated, using a common framework to allow these impacts to be compared.

Project methods

Through a suite of desktop research activities, this project will build on the 2023 GISERA study [Developing a wastewater lifecycle management framework for onshore gas in the Northern Territory](#) and the impact assessment carried out in the Geological and Bioregional Assessment (GBA) Program.

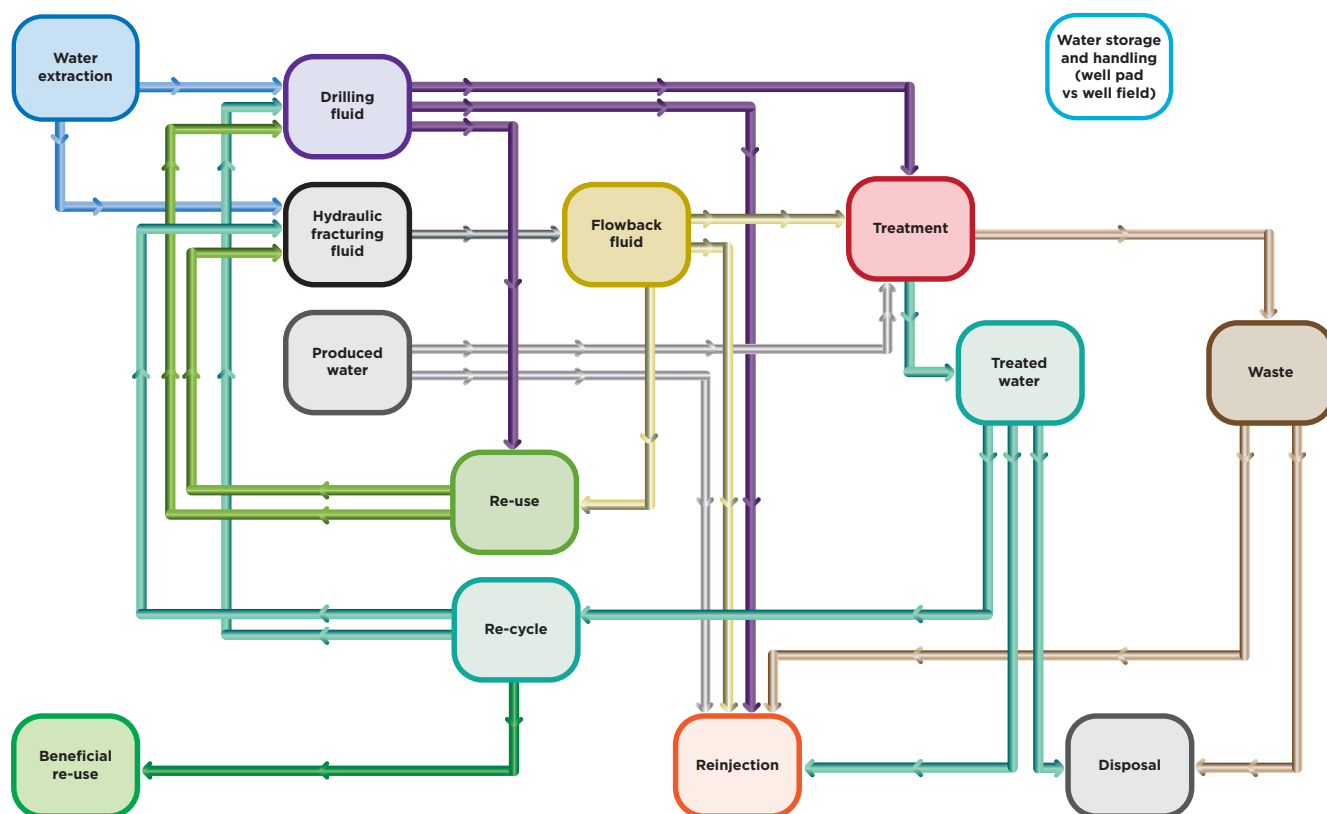
The first task will be to develop plausible scenarios for life cycle shale gas water use, wastewater management, treatment and disposal in the Beetaloo region.

As the industry is still in its early stages of development in the Northern Territory, there is a high degree of uncertainty on a range of aspects of the water cycle. The scenarios will be refined through consultation with the project's Technical Reference Group (TRG) before being presented to a workshop of key stakeholders for further refinement and endorsement.

Task 2 will investigate the potential environmental impacts for the scenarios identified in Task 1. While this assessment will consider potential environmental impacts across the whole lifecycle for each scenario, the emphasis is likely to be on the options for final disposal of waste material.

A significant component of Task 2 will be a review of the potential environmental impacts due to wastewater reinjection, including induced seismicity and contamination of aquifers, based on international literature and experience in other jurisdictions.

More information Read more [about this project](#) | Learn about other [GISERA research in the Northern Territory](#)



A schematic of the water cycle for a shale gas development showing potential flows of water and wastewater (indicated by arrows).

Further information | 1300 363 400 | gisera@csiro.au | gisera.csiro.au

GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.