



GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers

This project will improve our knowledge of groundwater systems in the Gunnedah and Surat basins in the Narrabri region of NSW. It will also identify the potential for hydrogeological pathways connecting deep coal seams and shallow aquifers.

Key points

- Community members are concerned about potential impacts on groundwater resources from proposed onshore gas development in the Narrabri region.
- CSIRO will conduct further research into groundwater systems in the Narrabri region.
- Understanding the integrity and continuity of aquitards is critical to identifying potential impacts of CSG activities on shallower groundwater resources.
- This research will investigate potential pathways connecting coal seam gas (CSG) layers and shallow aquifers.
- Researchers will adopt a multi-disciplinary approach that combines existing data with new targeted data to generate high-resolution 3D images.
- The approach will include an airborne electromagnetic survey to address knowledge gaps about the upper 400 metres to the surface.

Community concerns continue about potential impact of CSG development on the Pilliga Sandstone and the Namoi alluvium aquifers.

CSIRO research to date has found no prima facie evidence of strong connectivity between the deep coal seam gas development zone in the Gunnedah Basin and the shallow aquifers in the area.

The target coal seams and shallow aquifers are separated by aquitards that range in thickness from 300 to 700 metres. Aquitards are compacted layers of clay, silt or mud that act as a barrier for groundwater movement.

Narrabri Shire

The Narrabri Shire, in north-west NSW, covers approximately 13,000 square kilometres and is home to around 13,000 people with 6,000 living in the main town of Narrabri.

The shire is primarily a grazing and farming region, with irrigated cotton the main high-value crop in the region.

The Pilliga Sandstone and the Namoi alluvium aquifers have significant cultural, environmental and economic values.

The NSW and Federal Governments approved the Narrabri Gas Project, proposed by energy company Santos, in late 2020.

The project involves developing a coal seam gas field over 20 years with up to 850 gas wells and associated infrastructure.

Photo: The volcanic Warrumbungle Ranges south of Narrabri

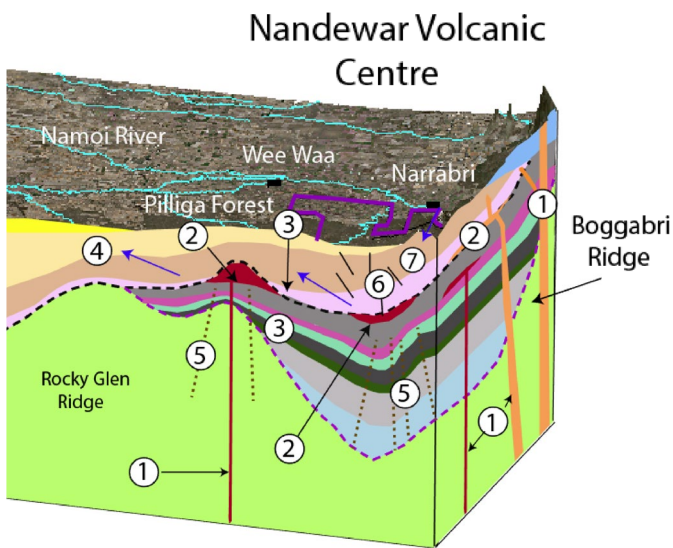


Existing research

CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) has completed three previous projects on groundwater systems in the Gunnedah and Surat basins.

These generated important knowledge about the nature of these systems and potential connectivity between deep target coal seams for CSG development and shallow agricultural aquifers.

While CSIRO research to date has found no evidence of strong connectivity between the deep coal seam gas development zone and the shallow, agriculturally important aquifers, this new research addresses knowledge gaps identified in previous research.



New research approach

CSIRO researchers will adopt a multi-disciplinary approach, combining existing data with targeted acquisition of new hydrochemistry, geochemistry and geophysical survey data.

Research outcomes will include the generation of high-resolution 3D images of subsurface structures, providing additional information on the potential for connectivity pathways.

Major research activities will include:

- Collection of additional hydrochemistry and environmental tracer baseline data.
- Collection of core samples for mineralogical analysis.
- Conducting an airborne electromagnetic AEM survey to fill in knowledge gaps about the top 400 metres to surface.
- Geochemical modelling.
- Data integration and conceptual model refinement.

All results will be made publicly available on [CSIRO's GISERA web site](#).

More information

Find out more about the [project Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers](#)

Learn about other [GISERA projects in NSW](#)

Potential hydrogeological connectivity pathways:

- ① Igneous intrusions (dykes)
- ② Igneous intrusions (sills and/or laccolith)
- ③ Thinning adjacent to basement highs (Purlawaugh Formation)
- ④ Stratigraphic contacts (intra-basin or at the basin margin)
- ⑤ Fault zones with significant vertical displacements
- ⑥ Fracture zones
- ⑦ Groundwater recharge to Pilliga Sandstone through outcrop beds

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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.