GISERA
Gas Industry Social and Environmental Research Alliance

Summary of research projects

MAY 2019

GISERA is conducting research that addresses the social and environmental impacts and opportunities arising from onshore gas developments.

Australian Government
Department of Industry, Innovation and Science

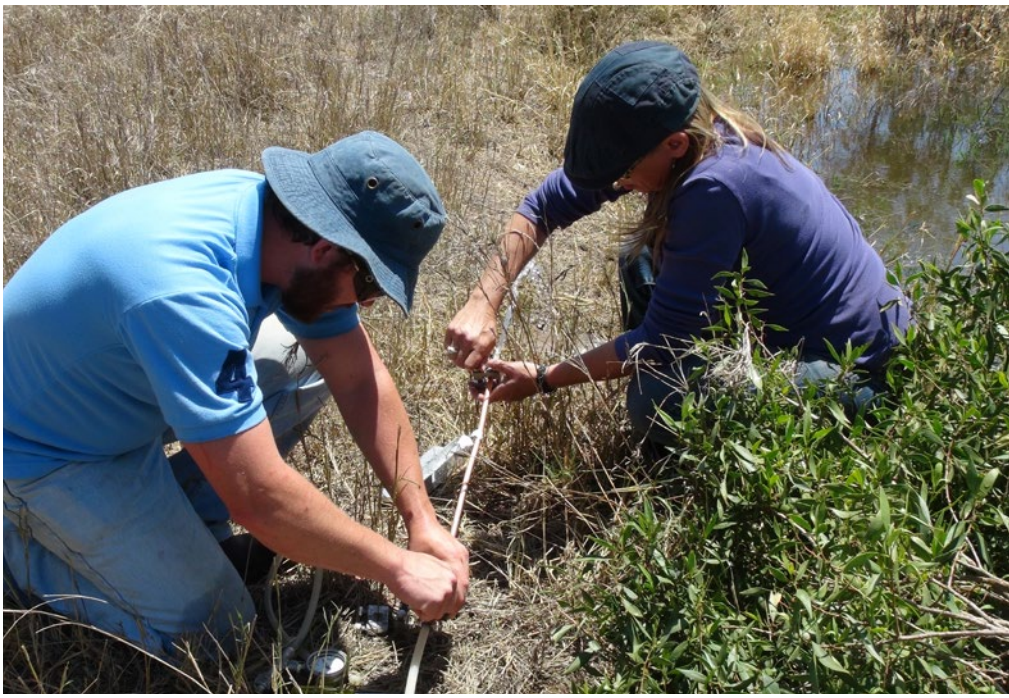
Supported by Government of South Australia

Surface and groundwater

Air, water and soil impact of hydraulic fracturing: Phase 2 Q

SCOPE: this project involves undertaking a comprehensive monitoring campaign to measure the air, surface water, groundwater and soil impacts of hydraulic fracturing of gas production wells in the Surat Basin, Queensland.

OUTCOMES: a series of reports summarising the impacts of hydraulic fracturing on air, water and soil quality, developed through a comprehensive on-site program of measuring air, water and soil before, during and after hydraulic fracturing activity.



Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux N

SCOPE: improve the understanding of the GAB groundwater flow in the Pilliga region through integration of existing information from models, hydrochemical data and environmental tracers.

OUTCOMES: assess the chances of extreme changes in GAB groundwater flux (flow volumes) as a result of CSG development using state of the art uncertainty analysis and modelling.

Improving the representation of the impact of CSG extraction in groundwater flow models for the Namoi region N

SCOPE: develop more representative models for estimating the groundwater impacts from coal seam gas well fields.

OUTCOME: improving the prediction of groundwater impacts by ensuring accurate representation of the effects of CSG production in the groundwater models being developed for the Namoi region.

Onshore gas and water contamination: causes, pathways and risks S

SCOPE: investigate potential groundwater contamination causes, pathways and vulnerability to understand onshore gas water quality impacts for south east South Australia.

OUTCOME: achieve a realistic quantification of groundwater contamination risks in gas, providing improved knowledge for regulators, industry and community.

Groundwater balance in gas development regions of south-east SA S

SCOPE: to improve hydrogeology and groundwater balance models in the onshore gas development regions of south-east SA.

OUCTOME: an improved understanding of groundwater flow regimes in the Otway Basin will help inform decision making and community understanding of licencing and management measures required for optimal water use.

Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids T

SCOPE: to understand how typical onshore gas chemicals degrade in relevant aquifers and soil types.

OUTCOME: information about microbial communities in aquifers and soils, and understanding how microbes influence degradation of typical onshore chemicals in soils and aquifers. This data can be used to assess the health of an ecosystem.

Characterisation of the stygofauna and microbial assemblages of the Beetaloo sub-Basin T

SCOPE: to better understand animals and microbes that live in subterranean groundwater.

OUTCOME: information about subterranean groundwater dependent ecosystems in the Beetaloo sub-Basin and Roper River system.

Q Queensland N New South Wales S South Australia T Northern Territory

Baseline monitoring of groundwater properties in the Beetaloo sub-Basin (T)

SCOPE: to better understand the geochemical properties, recharge rates and recharge mechanisms of groundwater.

OUTCOME: information about the baseline geochemistry and groundwater flow characteristics in the Cambrian Limestone Aquifer.

Microbial degradation of onshore gas-related chemical compounds (S)

SCOPE: to better understand the biodegradation of certain chemical compounds used in onshore gas production in the south-east of South Australia.

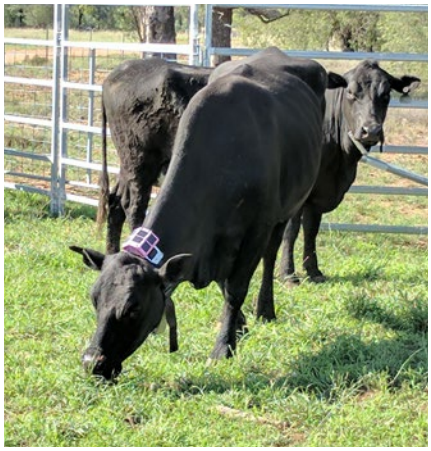
OUTCOME: information about which chemical compounds are degraded by microbes living in the soils and subsurface aquifers, and the impact on these microbial communities. This data can be used to assess the health of an ecosystem.

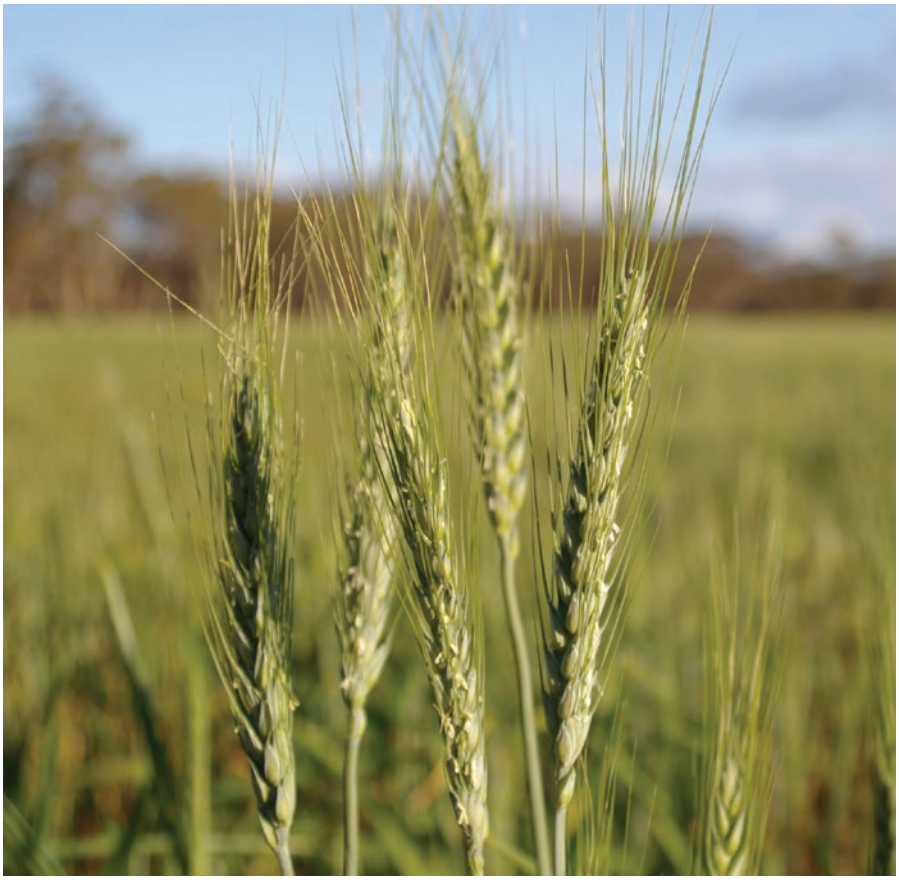
Agricultural land management

Gas impacts and opportunities on primary industries (S)

SCOPE: analyse possible impacts and opportunities from gas development for rural areas in South Australia's south east.

OUTCOMES: information to assist community understanding and inform policy regarding potential impacts and opportunities from conventional gas development on primary industries.





Greenhouse gas and air quality

Ambient air quality in the Surat Basin Q

SCOPE: comprehensive assessment of air quality in the Surat Basin region in Queensland using air quality easurement network and modelling.

OUTCOMES: identify the impact of CSG production activities on air quality in the Surat region.

Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve Q

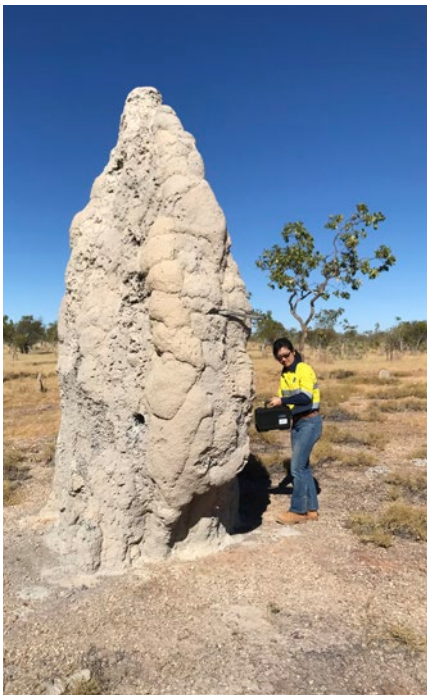
SCOPE: analysis of the whole of life cycle GHG emissions, including extraction, transportation and usage of CSG in the Surat Basin.

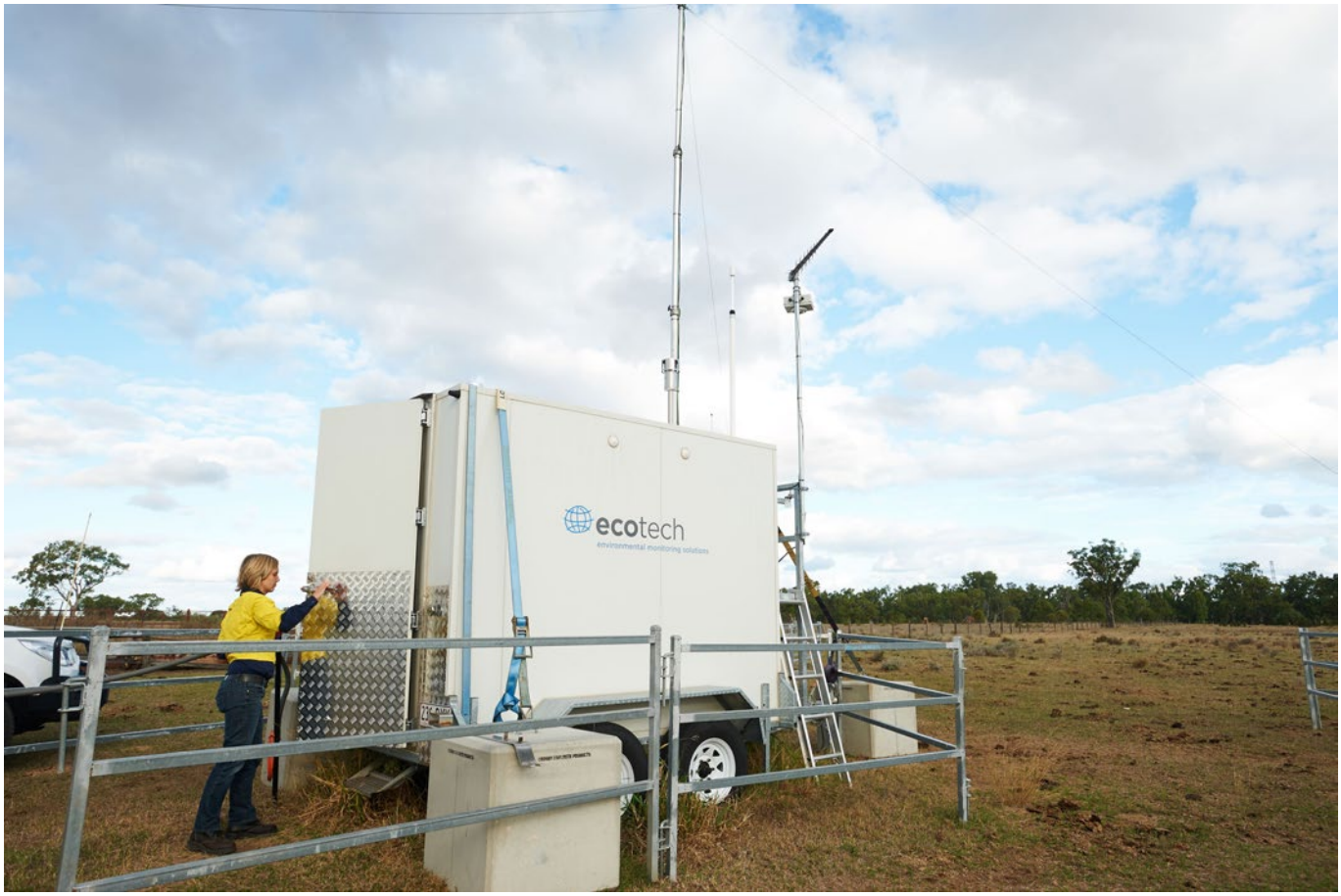
OUTCOMES: assessments of benefits and risks related to the extraction, transport and usage of gas in terms of their GHG emission footprint.

Baseline measurement and monitoring of methane emissions in the Beetaloo sub-Basin T

SCOPE: monitor and measure background methane levels and rate of change in methane levels during the dry, wet and fire seasons using mobile survey technology.

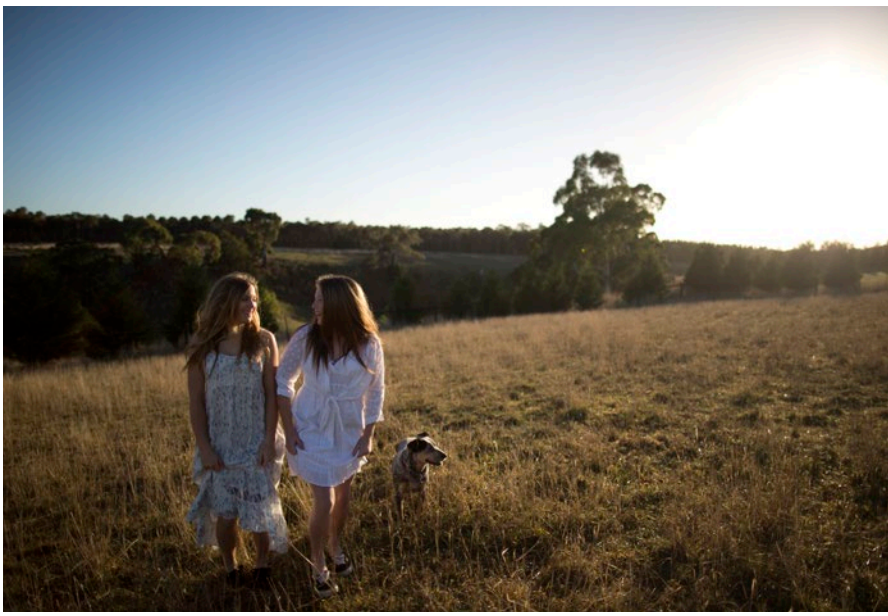
OUTCOMES: better understanding of the natural methane levels, over the various seasons, and identification of the source of these methane emissions in the Beetaloo sub-Basin. This will provide a baseline for accurately quantifying any future onshore gas impacts.





Q Queensland N New South Wales S South Australia T Northern Territory

Health impact



Potential human health impacts from CSG activities Q

SCOPE: establish processes and governance to ensure research quality, define the project boundary, conduct hazard identification and exposure pathways, and screen data.

OUTCOME: identify potential chemical and physical hazards and exposure pathways assess the quality of existing data and gaps in the data collected. Key issues will be selected for further in-depth assessment as part of the project to enable the health study framework to be demonstrated in its entirety.

Social and economic

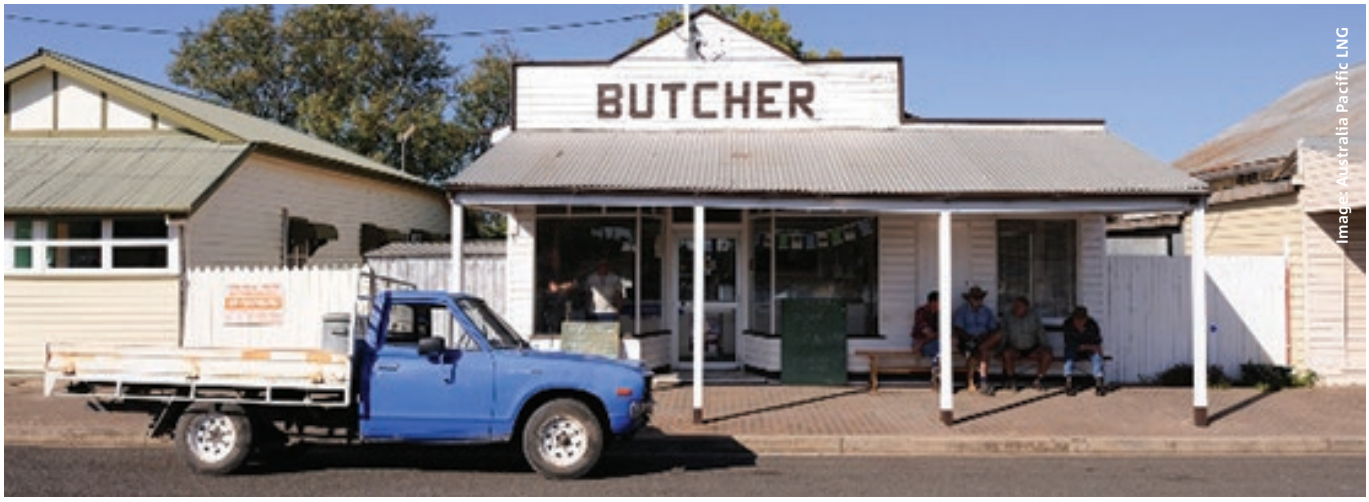


Image: Australia Pacific LNG

Trends in community wellbeing and attitudes to CSG development, Survey 3 Q

SCOPE: monitor and communicate changes and trends in community wellbeing, resilience and attitudes to CSG development across different phases of industry operation in south west Queensland.

OUTCOME: a more comprehensive understanding of community wellbeing and attitudes to CSG over time and between regions to enable more strategic and proactive policy and planning around CSG development.

Community well-being and attitudes to conventional gas S

SCOPE: measure levels of perceived risk, benefits, knowledge, and other underlying drivers of trust and social acceptance of conventional gas development in SA's south east, and develop baseline data on community values, well-being and future expectations.

OUTCOMES: baseline information about community well-being, perceptions, expectations and resilience for conventional gas development, to improve awareness and knowledge.

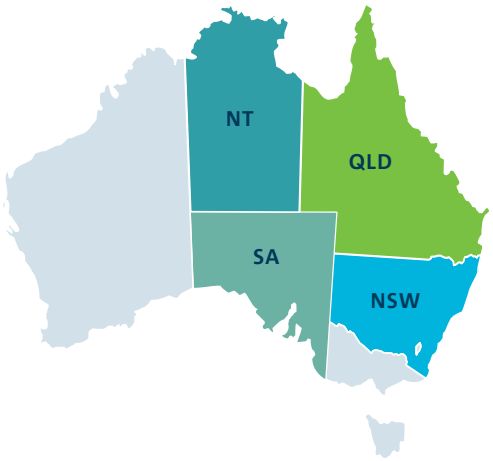
Assessing the value of locally produced conventional gas in SA's South East S

SCOPE: develop a profile of the gas industry and its role within the regional economy and develop scenarios for how the local gas industry may evolve.

OUTCOME: knowledge for policy makers and local businesses regarding the socio-economic value of gas activity for local communities, and an improved capacity to forecast outcomes from industry development.

Research projects by region

GISERA's integrated research program and regional focus ensures that its research identifies cumulative impacts from onshore gas developments and informs coordinated responses across industry, community and government.



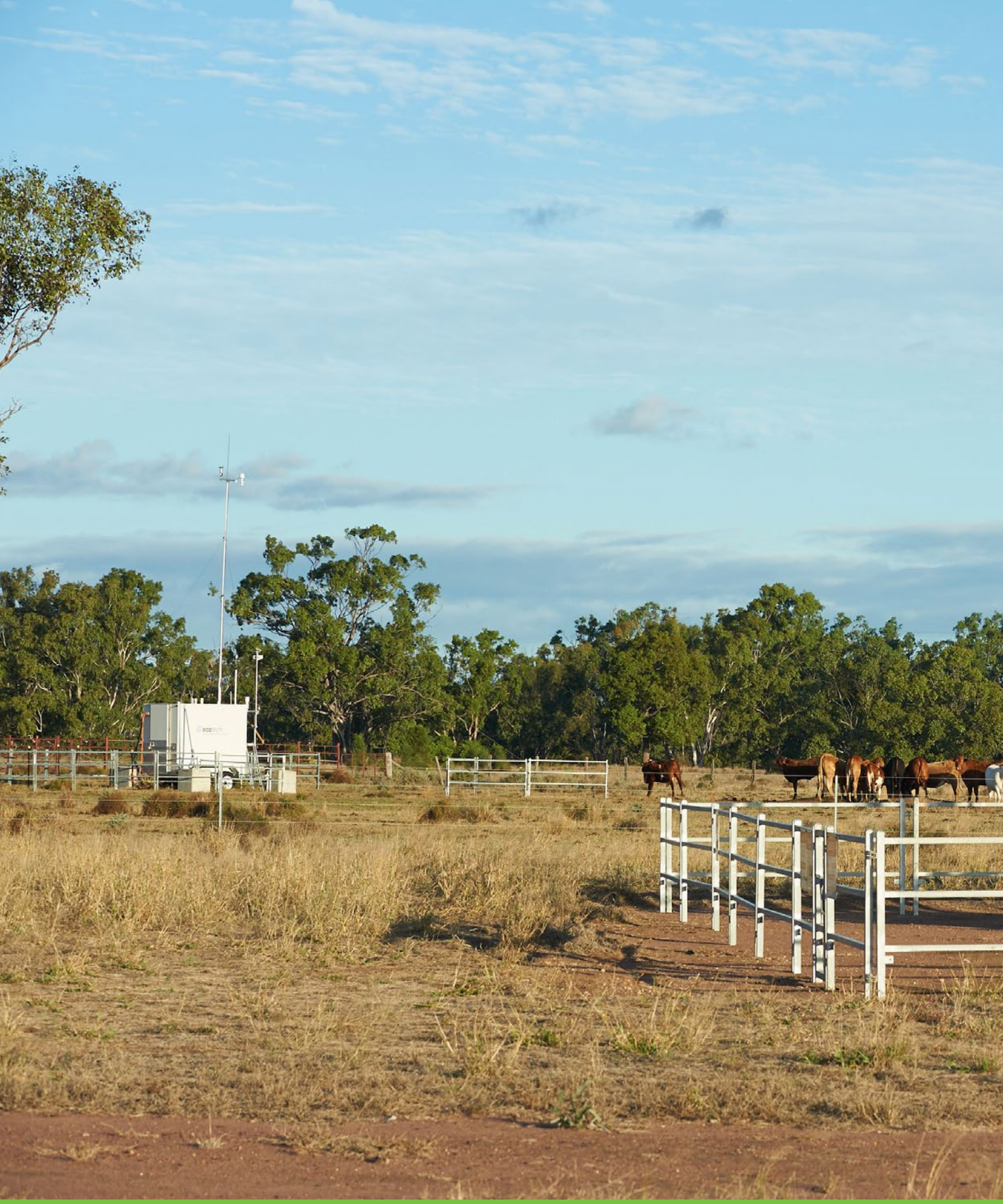
RESEARCH AREA	QUEENSLAND	NEW SOUTH WALES	SOUTH AUSTRALIA	NORTHERN TERRITORY
Surface and groundwater	• Hydrocarbons in groundwater, Surat and Bowen basins* • Geochemical responses to re-injection* • Re-injection of CSG water* • Isotope and geochemical groundwater baseline study* • High performance groundwater modelling* • Improving groundwater flow models* • Groundwater contamination risk assessment* • Air, water and soil impact of hydraulic fracturing* • Air, water and soil impact of hydraulic fracturing: Phase 2	• Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux • Spatial design of groundwater monitoring network in the Narrabri Gas Project area* • Improving the representation of the impact of coal seam gas extraction in groundwater flow models for the Namoi region • Groundwater contamination risk assessment*	• Onshore gas and water contamination: causes, pathways and risks • Groundwater balance in gas development regions of south-east SA • Microbial degradation of onshore gas-related chemical compounds	• Characterisation of the stygofauna and microbial assemblages of the Beetaloo sub-Basin • Baseline monitoring of groundwater properties in the Beetaloo sub-Basin • Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids
Terrestrial biodiversity	• Priority threat identification, management and appraisal* • Fire ecology of grassy woodlands* • Ensuring biodiversity offset success: the right kind of seed for a rare daisy* • Habitat selection by two focal species* • Guidelines for offset population sizes*			
Marine environment	• Sustaining turtles and their homes*			
Greenhouse gas and air quality	• Methane seepage in the Surat Basin* • Ambient air quality in the Surat Basin • Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve	• Regional methane emissions in NSW CSG basins*		• Baseline measurement and monitoring of methane emissions in the Beetaloo sub-Basin
Agricultural land management	• Preserving agricultural productivity* • Shared space* • Gas farm design* • Making tracks, treading carefully* • Without a trace* • Telling the story* • Inside the heard*		• Gas impacts and opportunities on primary industries	
Health impact	• Potential human health impacts from CSG activities	• Human health effects of CSG activity: Review and study design*		
Social and economic	• Monitoring regional transition* • Understanding community aspirations* • Economic assessment and forecasting project* • Community functioning and well-being* • Community function and well-being Survey 2* • Trends in community wellbeing and attitudes to CSG development, Survey 3	• Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations* • Social baseline assessment of the Narrabri region of NSW in relation to CSG development* • Decommissioning pathways for CSG projects*	• Community well-being and attitudes to conventional gas • Assessing the value of locally produced conventional gas in SA's South East	

*These projects have been completed and their reports are available at gisera.csiro.au

Completed projects

The projects listed below have been completed.
Their reports and fact sheets are available at gisera.csiro.au

PROJECT TITLE	RESEARCH AREA	REGION OF RESEARCH
Isotope and geochemical groundwater baseline study	Surface and groundwater	Queensland
Geochemical responses to re-injection	Surface and groundwater	Queensland
Re-injection of CSG water	Surface and groundwater	Queensland
High performance groundwater modelling	Surface and groundwater	Queensland
Air, water and soil impact of hydraulic fracturing	Surface and groundwater	Queensland
Improving groundwater flow models	Surface and groundwater	Queensland
Hydrocarbons in groundwater, Surat and Bowen basins	Surface and groundwater	Queensland
Groundwater contamination risk assessment	Surface and groundwater	Queensland / New South Wales
Spatial design of groundwater monitoring network in the Narrabri Gas Project area	Surface and groundwater	New South Wales
Priority threat identification, management and appraisal	Terrestrial biodiversity	Queensland
Fire ecology of grassy woodlands	Terrestrial biodiversity	Queensland
Ensuring biodiversity offset success: the right kind of seed for a rare daisy	Terrestrial biodiversity	Queensland
Habitat selection by two focal species	Terrestrial biodiversity	Queensland
Guidelines for offset population sizes	Terrestrial biodiversity	Queensland
Sustaining turtles and their homes	Marine environment	Queensland
Methane seepage in the Surat Basin	Greenhouse gas and air quality	Queensland
Regional methane emissions in NSW CSG basins	Greenhouse gas and air quality	New South Wales
Preserving agricultural productivity	Agricultural land management	Queensland
Shared space	Agricultural land management	Queensland
Gas farm design	Agricultural land management	Queensland
Making tracks, treading carefully	Agricultural land management	Queensland
Without a trace	Agricultural land management	Queensland
Telling the story	Agricultural land management	Queensland
Inside the heard	Agricultural land management	Queensland
Human health effects of CSG activity: Review and study design	Health impact	New South Wales
Monitoring regional transition	Social and economic	Queensland
Understanding community aspirations	Social and economic	Queensland
Economic assessment and forecasting project	Social and economic	Queensland
Community functioning and well-being	Social and economic	Queensland
Community function and well-being survey 2	Social and economic	Queensland
Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations	Social and economic	New South Wales
Social baseline assessment of the Narrabri region of NSW in relation to CSG development	Social and economic	New South Wales
Decommissioning pathways for CSG projects	Social and economic	New South Wales



ABOUT GISERA

The Gas Industry Social and Environmental Research Alliance (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, 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. Visit gisera.csiro.au for more information about GISERA's governance structure, projects and research findings.

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

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