Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Annual Research and Development Plan, Budget and Summary

2023/24

CSIRO | Australian Government Department of Industry, Science and Resources | NSW Government | Supported by Government of South Australia | Queensland Government | Northern Territory Government | origin | Australia Pacific LNG | QGC | Santos

Contents

Cover image: CSIRO researchers measuring the amount of dissolved oxygen in bore water in the Beetaloo Sub-basin, Northern Territory. The measuring device is carefully lowered into the bore using fishing line. Credit: Gavin Rees.

About CSIRO's GISERA

Established in 2011, the CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) undertakes publicly-reported, peer-reviewed social and environmental research on the impacts and opportunities arising from gas development, nationally.

Aims

The purpose of CSIRO's GISERA is to provide high quality, independent scientific research and information to communities living in gas development regions. The research focuses on environmental and socio-economic topics including:

- Ground and surface waters
- Biodiversity
- Agriculture
- Social and economic impacts
- Health
- Greenhouse gases and air quality
- Land and infrastructure

Objectives

GISERA's primary objectives remain to:

- carry out independent research and improve and extend knowledge of social and environmental impacts and opportunities of onshore gas projects, primarily for the benefit of communities living in gas development regions and the broader public
- inform governments, regulators and policy-makers about key issues regarding policy and legislative frameworks for the gas industry
- improve gas industry operations in regions where exploration and production activities are occurring.

Partners

CSIRO's GISERA is a national collaboration and partners with the Australian Government, the Governments of New South Wales, Queensland, South Australia and the Northern Territory.

Members of GISERA now include Australia Pacific LNG, QGC, Santos and Origin Energy.

We also collaborate with universities and research institutes, nationally.

Governance

The GISERA governance model is central to ensuring independence and transparency in the research undertaken by CSIRO. State and Territory-based Research Advisory Committees are critical to GISERA's values and value proposition. With a majority of members who are not affiliated with the gas industry (Figure 1), the committees oversee and approve all research projects within GISERA to ensure CSIRO's independence.

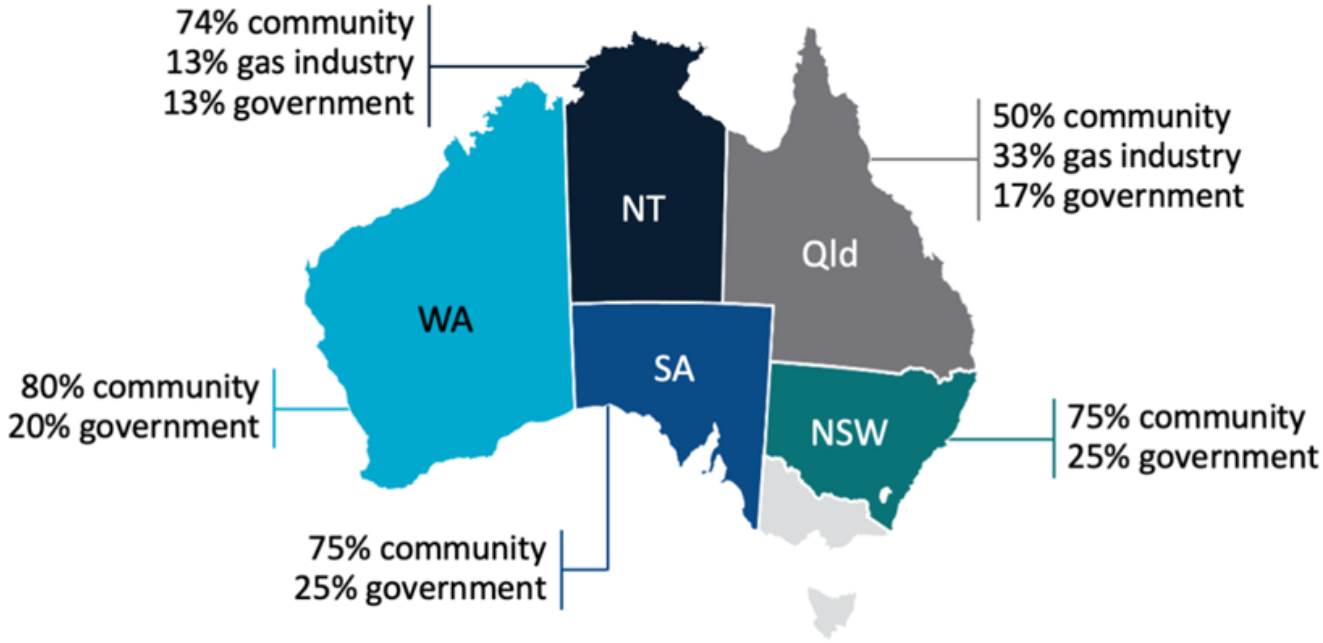

Figure 1 GISERA Research Advisory Committee composition across each of the states and territories

Director's summary

This is the twelfth Annual Research and Development Plan, Budget and Summary of CSIRO's GISERA. It provides a summary of our research and communication activities and financial performance for the year ended 30 June 2023. It also provides our plan for 2023/24.

The 2022/23 financial year progressed the national expansion of CSIRO's GISERA, with eleven new projects approved taking the total number of GISERA projects to 90 and total research investment to $44,925,496[1] over the life of GISERA.

CSIRO ensures all output and activities during the year contribute to GISERA's credibility, trust and respect through the open and transparent conduct and communication of its research and synthesis activities. All GISERA results and research outputs including scientific reports, journal papers and supporting communication products such as factsheets, communiques and online articles, are available to view and download at www.gisera.csiro.au.

2022/23 At a Glance

- 84 CSIRO researchers from 6 business units, across 16 sites throughout Australia delivering science for GISERA
- 32 research project collaborations
- 11 new projects developed, representing a research investment of $5,305,953
- 6 research projects completed
- 10 project reports published
- 150 citations on GISERA-generated scientific publications
- All state and territory Research Advisory Committees reconstituted
- New funding agreement with Northern Territory Government established
- 10,034 website visits and 29,529 page views
- 4,845 video views
- 231 stakeholder engagements
- GISERA fact sheets turned into audio scripts suitable for translation into Indigenous languages
- 22 fact sheets developed.

[1] This includes CSIRO in-kind contribution.

Looking ahead

There are 28 existing projects currently in progress or planned to commence in 2023/24 and beyond. Of these, 14 projects are scheduled for completion in 2023/24. The research results will be released with a suite of complementary communication products.

CSIRO, through its GISERA activities will continue to engage with stakeholders in each of the states and territories to learn about new or evolving areas of concern for communities in gas development regions associated with onshore gas development. Plans for the 2023/24 year include the development of the next tranche of research projects that will address the priority areas of concern.

The scale of GISERA research activity in CSIRO continues to increase, with the involvement of more than 235 researchers of the highest distinction and potential, over the life of GISERA and across the following business units:

- Energy
- Environment
- Mineral Resources
- Agriculture & Food
- Health & Biosecurity
- Manufacturing
- Data 61
- National Collections & Marine Infrastructure
- Space & Astronomy.

In 2023/24, we look forward to ongoing and increased research collaboration opportunities across Australia. We will seek to expand membership to CSIRO's GISERA Alliance.

1 Research Advisory Committees' activities

1.1 Queensland

The Queensland Research Advisory Committee met in November 2022, resulting in:

- Approval of health project titled 'Exposure assessment of identified chemicals used in CSG activities'. This project will improve the understanding of the potential presence, distribution and exposure of identified chemicals associated with CSG activities in the Surat Basin, in southern Queensland. These chemicals were identified in the previous CSIRO GISERA study 'Potential health effects of CSG activity in the southern Surat Basin'.
- Approval of health project titled 'Analysis of dust near CSG sites to assess potential for respirable crystalline silica'. This project will look at the potential presence, composition and distribution of respirable crystalline silica from dust samples nearby CSG operations in Queensland.
- Approval of socio-economic project titled 'Evaluating medium-term socio-economic impacts of onshore gas activity in Southern Queensland'. This project will study a range of potential positive and negative social, demographic and economic impacts that are commonly linked to onshore natural gas extraction activity, across the regions of the Surat and Bowen basins, in southern Queensland.
- Approval of a land and infrastructure project titled 'Queensland CSG well integrity: cements, steels and microbial activity'. This project aims to collate details on materials used in well casings and cements from current and historic information within Well Completion Reports from the Surat and Bowen Basins. The project will also review information on microbial activity in related geological formations from published papers and CSIRO reports. The information will be reported in a comprehensible format to improve understanding and reduce uncertainty about steels, cements and microbial activity within CSG wells in Queensland.

The Queensland Research Advisory Committee met again in June 2023, resulting in:

- Approval of greenhouse gas footprint project titled 'Addressing knowledge gaps on key controls or contributors to methane emissions from CSG water holding ponds in the Surat Basin, Queensland'. For this project, the data will focus on the role that methane generating and eating microbes, algae, brine and sediment play in the methane emission contributions of water holding ponds. Such data will assist in understanding the potential of the CSG industry to contribute to emissions in the Surat Basin/Western Downs region of Queensland.
- Approval of greenhouse gas footprint project titled 'Comprehensive survey of methane emissions from Queensland coal seam gas water holding ponds in the Surat Basin'. This project will select multiple representative CSG holding ponds to accurately quantify methane emissions, in both summer and winter, using rigorous sampling methods to minimise known methane measurement limitations. This project will provide new data on methane emissions

from CSG holding ponds, which will fill critical knowledge gaps, and enhance community's understanding of the potential climate impacts from coal seam gas production in Queensland.

- Approval of greenhouse gas footprint project titled 'Using carbon and hydrogen isotopes to fingerprint sources of methane emissions from the Western Downs Region in the Surat Basin, Queensland'. This project will be conducted in the study area bounded by the towns of Chinchilla, Condamine and Tara in Queensland, and will conduct isotopic fingerprinting of methane at various sites (including gas industry, agricultural, wastewater treatment, swamps, natural seeps, landfills). Sites will be selected through community and industry consultation, and guided by results from an atmospheric methane survey. These data will provide accurate methane source discrimination and possible attribution.

One project was completed during this reporting period:

- 'Potential health impacts from CSG'

There are ten projects currently underway or scheduled to commence and 32 projects complete in Queensland.

1.2 New South Wales

The New South Wales Research Advisory Committee met in November 2022, resulting in:

- Approval of a biodiversity project titled 'Remote sensing and threatened species surveys to better understand risks of forest fragmentation from the Narrabri Gas Project'. This project will provide scientific understanding needed to determine how fragmentation resulting from Narrabri Gas Project land clearing activities will add to the existing impacts from prior land use fragmentation on biodiversity in the region.
- Approval of surface and groundwater project titled 'Review of beneficial reuse or end-use options for brine from the Narrabri Gas Project region'. The Narrabri Gas Project will generate large volumes of saline 'produced water' which requires treatment to a standard which will allow for beneficial reuse of the treated water. The aim of this project is to collate existing data on brine and salt management in the region; review existing and emerging technologies and solutions; analyse the costs and benefits of brine reuse and end-use options; and share results with the local community.

There are seven projects currently underway or scheduled to commence and eleven projects complete in New South Wales.

1.3 South Australia

There were no South Australia Research Advisory Committee meetings held in 2022/23.

Three projects were completed during this reporting period:

- 'Perspectives on risk to local markets and industries'

- 'Decision support framework for future groundwater development scenarios in south east South Australia'
- 'The role of gas in South Australia'

There is one project currently underway, and nine projects complete in South Australia.

1.4 Northern Territory

The Northern Territory Research Advisory Committee met in June 2023, resulting in:

- Approval of a surface and groundwater project titled 'Environmental baseline characterisation of the springs in Hot Springs Valley, NT.' This project will conduct a field campaign to collect detailed data on the geology, hydrogeology and ecology of the Hot Springs Valley to augment data collected in previous surveys. This information will provide an important evidence base for protection and management of this environmentally and culturally significant area, extend the existing knowledge of this unique system, and provide a baseline prior to any potential development of gas resources in the nearby Beetaloo Sub-basin.

Out of session, the Northern Territory Research Advisory Committee provided:

- Approval of a biodiversity project titled 'UAV–LiDAR and spaceborne remote sensing for site survey and habitat condition monitoring in the Beetaloo'. This project will develop a scalable approach for monitoring the structural condition of vegetation in the Beetaloo Sub-basin. UAV-LiDAR technology provides a bridge between what can be collected in the field, and what can be estimated from space. It provides a robust snapshot of ecosystem state at a particular point in time, that can be used for calibrating and validating satellite remote sensing products.

Two projects were completed during this reporting period:

- 'Offsets for life cycle greenhouse gas emissions of onshore gas in the NT'
- 'Onshore gas water lifecycle management options framework'

There are nine projects currently underway or scheduled to commence and nine projects complete in the Northern Territory.

1.5 Western Australia

There were no Western Australia Research Advisory Committee meetings held in 2022/23.

There is one project currently underway, and 2 projects complete in Western Australia.

Project modifications and progress reporting

An approved research project consists of a Project Order and Budget that has been approved by the Research Advisory Committee.

During the execution of an approved project, changes and modifications to the Project Order and Budget may be submitted to the Director for consideration. The Director may approve minor modifications to Project Orders that do not significantly alter the proposed outcomes, and do not have significant financial consequences for the project. The Director may consult the Research Advisory Committee about these modifications.

Major modifications to Project Orders that may involve significant financial consequences or significant change in project scope will be prepared in consultation with the Director and presented to the Research Advisory Committee for approval. Any changes made to Project Orders are available for public perusal on CSIRO GISERA's website www.gisera.csiro.au.

Research updates and progress against project milestones are reported quarterly. Variations, if any, are also included as this allows any variations/modifications to the Project Order to be tracked easily. Summaries of each project's progress against milestones and variations, as well as the original Project Order, are available on the GISERA website: www.gisera.csiro.au/research/.

2 Consolidated Budget

This is the twelfth *GISERA Annual Research & Development Plan, Budget and Summary* and covers the financial year 2023/24.

The report objectives are to:

- Detail the contribution of each Partner to GISERA.
- Detail the contribution of government departments to GISERA.
- Include the committed research investment and expenditure for existing projects.
- Identify proposed research projects to be considered in the new financial year.

2.1 Consolidated Budget

2.1.1 Contributions and Grants

The committed financial contributions received from membership, in-kind, grants, funding agreements, APPEA and other industry contributions (separate from membership) over the life of GISERA is outlined in Table 2.1, and a summary of contributions by group shown in Figure 2.

Table 2.1 Incoming contributions and grants, by contributor, 2011/12-2022/23

GROUP	PAYMENT TYPE	CONTRIBUTOR	TOTAL
Industry	Membership	Australia Pacific LNG	**$10,900,000**
		QGC	**$1,750,000**
		Santos	**$1,500,000**
		AGL	**$287,500**
		Origin Energy	**$1,050,000**
		Pangaea Resources	**$150,000**
	Contribution to project W11 (Air, water and soil impacts of hydraulic fracturing: Phase 1)	Australia Pacific LNG	**$245,670**
	Contribution to project W12 (Air, water and soil impacts of hydraulic fracturing: Phase 2)	Australia Pacific LNG	**$1,285,000**
	Contribution via APPEA to project GHG 1 (Methane Seepage in the Surat Basin)	Australia Pacific LNG, Santos, Arrow Energy & QGC	**$1,121,707**
Government	Grant	Federal Government	**$18,887,000**
		NSW Government	**$1,500,000**
		SA Government	**$1,000,000**
		QLD Government[2]	**$500,000**
		NT Government	**$1,400,000**
	Contribution to project GHG 5 (Baseline measurement and monitoring of methane emissions in the Beetaloo Sub-basin)	NT Government	**$305,297**
	In-kind contribution to project W25 (Baseline seismic monitoring of the Canning Basin)	Geological Survey of WA (GSWA)	**$1,154,800**
	In-kind contribution to project W25 (Baseline seismic monitoring of the Canning Basin)	Geoscience Australia (GA)	**$300,000**
CSIRO	In-kind	CSIRO	**$15,362,634**
Other	In-kind contribution to project L5 (Without a Trace)	University of Southern Queensland (USQ)	**$79,990**
	In-kind contribution to project W18 (Characterisation of the Stygofauna and microbial assemblages of the Beetaloo Sub-basin)	Charles Darwin University (CDU)	**$53,858**
TOTAL			**$58,833,457**

[2] QLD Government's grant to go towards the Health 2 project 'Potential health impacts from CSG'.

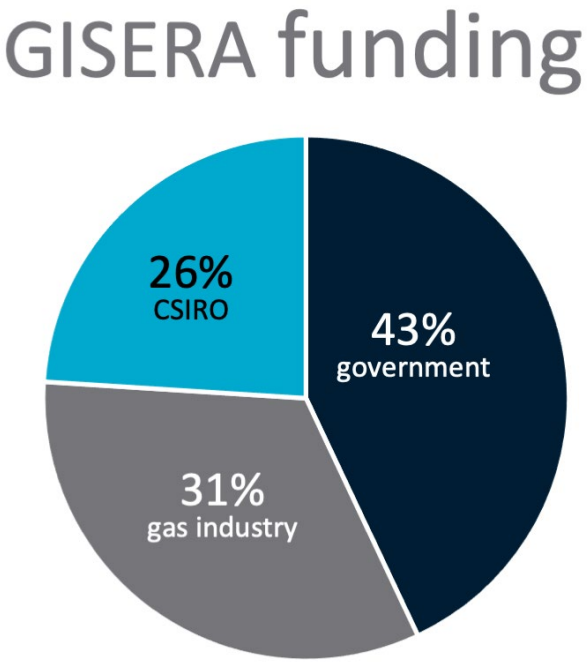

Figure 2 Committed contribution over life of GISERA, by group[3]

[3] The 0.23% contribution from universities has been included in table 2.1, but not included in this pie chart.

2.1.2 Committed Research Investment

The committed budget for projects across all regions for 2011/12-2026/27 now stands at $44,925,496. A breakdown of the committed research budget for the various research subject areas, and each state and territory are provided in Tables 2.2 and 2.3, respectively. Figure 3 shows the portion committed to each research subject area and Figure 4 shows the portion committed to each region.

Table 2.2 Committed research investment across all regions, by research subject area, 2011/12-2026/27

RESEARCH SUBJECT AREA	TOTAL RESEARCH INVESTMENT
Surface and groundwater	**$18,765,406**
Greenhouse gases and air quality	**$6,001,317**
Biodiversity	**$5,618,244**
Social and economic impacts	**$5,104,522**[4]
Agricultural	**$3,476,011**
Land and infrastructure	**$3,388,104**
Health	**$2,571,892**
Total	**$44,925,496**[5]

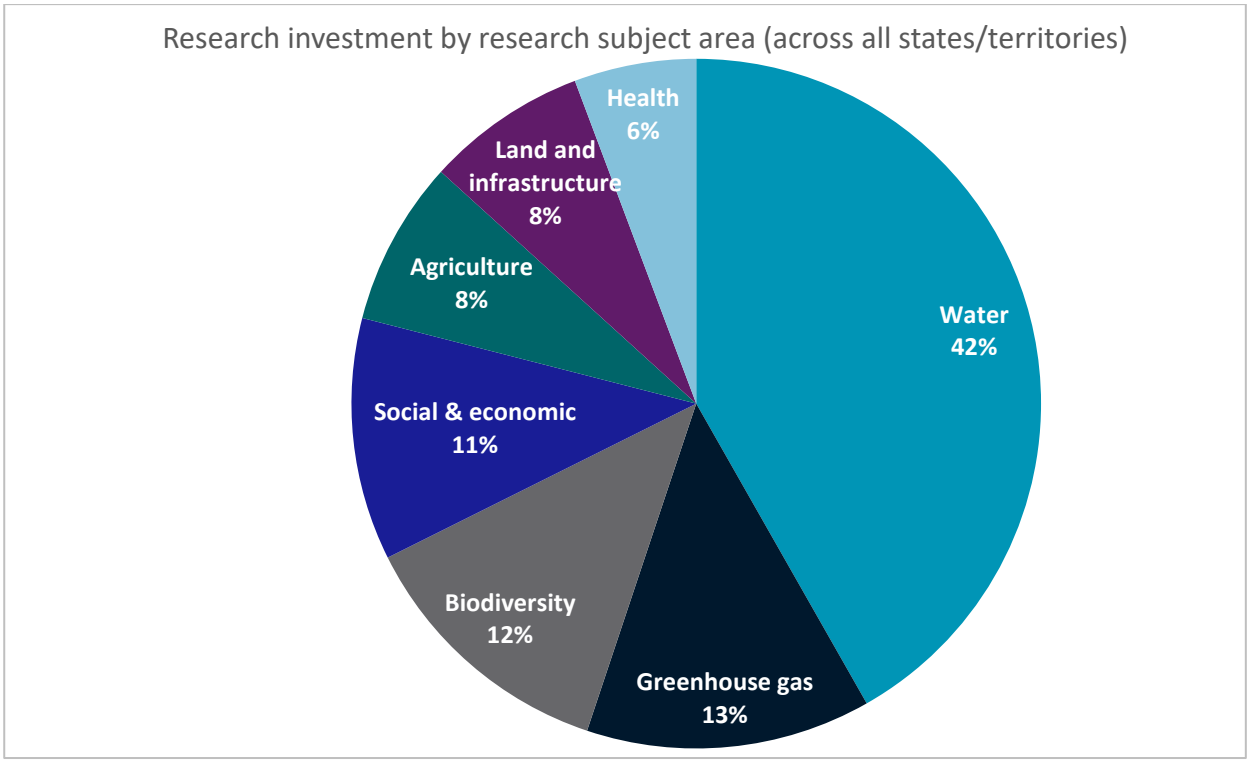

Figure 3 Committed research investment across all states/territories, by research subject area, 2011/12-2026/27

[4] This includes $289,388 allocated to a social and economic project 'Monitoring community wellbeing and attitudes to CSG development in Narrabri (construction phase)'. This research project is contingent on the construction phase of gas development in the Narrabri Shire commencing. If project does not proceed, funds will be returned for future reallocation.

[5] These figures do not include funds for the GISERA Director's office and communications.

Table 2.3 Committed research investment across by state/territory, 2011/12-2026/27

STATE / TERRITORY	TOTAL RESEARCH INVESTMENT
Queensland	**$23,799,475**
Northern Territory	**$8,835,569**
New South Wales	**$7,331,502**
South Australia	**$2,670,270**
Western Australia	**$2,288,680**
Total	**$44,925,496**

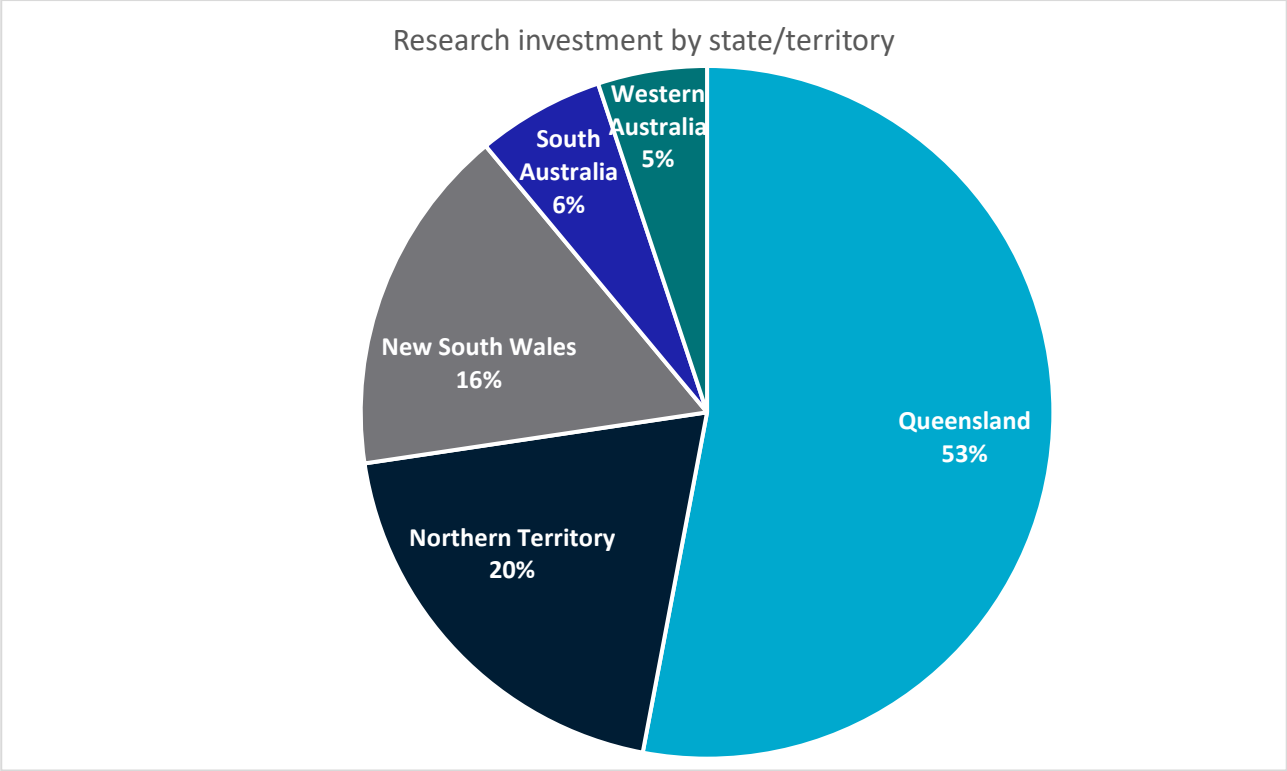

Figure 4 Committed research investment, by state/territory 2011/12-2026/27

2.2 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.

Figure 5 shows the total number of research projects in each state and territory over the life of GISERA.

Figure 5 Number of research projects in each active state and territory

Table 2.4 Research projects across Australia currently underway or due to commence

RESEARCH AREA	PROJECT
Surface and groundwater	• Microbial degradation of chemicals and fluids in aquifers of the Limestone Coast (SA) • Fate of hydraulic fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface (NT) • Microbial communities and their ability to degrade prospective chemicals used in coal seam gas activities (NSW) • Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers (NSW) • Groundwater modelling and predictive analysis to inform CSG impact assessment, monitoring and management (NSW) • Cooper Creek flood modelling scenarios (QLD) • Examination of stygofauna ecosystems of the Beetaloo Sub-basin (NT) • Environmental baseline characterisation of springs in Hot Springs Valley (NT) • Review of beneficial reuse or end-use options for brine from the NGP region (NSW)
Social and economic	• Monitoring community wellbeing and attitudes to CSG in Narrabri (pre-construction phase) (NSW) • Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase) (NSW) • Trends in community wellbeing and attitudes to CSG development – Comparisons across industry phases from 2014 to 2024 (QLD) • Evaluating medium-term socio-economic impacts of onshore gas activity in Southern Queensland (QLD)
Greenhouse gases and air quality	• Methane emissions quantification of well drilling to completion processes in Beetaloo Sub-basin (NT) • Methane contributions from holding ponds – a desktop study (QLD) • Key controls or contributors to methane emissions from CSG water holding ponds (QLD) • Comprehensive survey of methane emissions from Queensland coal seam gas water holding ponds in the Surat Basin (QLD) • Using carbon and hydrogen isotopes to fingerprint sources of methane emissions from the Western Downs Region in the Surat Basin (QLD)
Biodiversity	• Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo (NT) • Remote sensing and threatened species surveys to better understand risks of forest fragmentation from the Narrabri Gas Project (NSW) • UAV–LiDAR and spaceborne remote sensing for site survey and habitat condition monitoring in the Beetaloo (NT)
Agriculture	• Putting land management knowledge into practice (NT)
Health	• Exposure assessment of identified chemicals used in CSG activities (QLD) • Analysis of dust near CSG sites to assess potential for respirable crystalline silica (QLD)
Land and infrastructure	• Baseline seismic monitoring of the Canning Basin (WA) • Background Seismicity of Beetaloo Sub-Basin and Seismic Hazard (NT) • Beetaloo basin shale long-term competency after decommissioning (NT) • Queensland CSG well integrity: cements, steels and microbial activity (QLD)

Details on already completed projects can be found below in each of the state and territory sections.

3 Queensland R&D Plan & Budget

3.1 Queensland Investment profile

3.1.1 Committed research investment for 2011/12-2025/26

The committed budget for projects in Queensland for 2011/12-2025/26 now stands at $23,799,475. A breakdown of the committed research budget across the various research subject areas is provided in Table 3.1 and Table 3.2 shows the investment committed by contributor.

Table 3.1 Committed research investment in Queensland by research subject area, 2011/12-2025/26

TOPIC	TOTAL RESEARCH INVESTMENT
Surface and groundwater (32%)	**$7,590,517**
Greenhouse gases and air quality (17%)	**$4,126,090**
Biodiversity (17%)	**$3,991,757**
Agriculture (12%)	**$2,809,166**
Social & economic (11%)	**$2,606,884**
Health (10%)	**$2,299,368**
Land and infrastructure (1%)	**$375,693**
Total	**$23,799,475**

Table 3.2 Committed research investment in Queensland by contributor, 2011/12-2025/26

CONTRIBUTOR	CONTRIBUTION TYPE	TOTAL RESEARCH CONTRIBUTION
Australia Pacific LNG (47%)	GISERA Membership	**$9,365,985**
	Contribution via APPEA to project GHG 1 (Methane Seepage in Surat Basin)	**$280,427**
	Contribution to project W11 (Air, water and soil impacts of HF: Phase 1)	**$245,670**
	Contribution to project W12 (Air, water and soil impacts of HF: Phase 2)	**$1,285,000**
QGC (7.4%)	GISERA Membership	**$1,477,902**
	Contribution via APPEA to project GHG 1 (Methane Seepage in Surat Basin)	**$280,427**
Santos (1.2%)	Contribution via APPEA to project GHG 1 (Methane Seepage in Surat Basin)	**$280,427**
Arrow Energy (1.2%)	Contribution via APPEA to project GHG 1 (Methane Seepage in Surat Basin)	**$280,427**
Origin (0.5%)	GISERA Membership	**$117,659**
Federal Govt (12.3%)	Grant	**$2,934,432**
Qld Govt (2.1%)	Grant	**$500,000**
CSIRO (28.0%)	In-kind	**$6,671,129**
USQ (0.3%)	In-kind contribution to project L5 (Without a Trace)	**$79,990**
Total		**$23,799,475**

3.1.2 Queensland Current Research Portfolio

A summary of all approved research projects in Queensland is provided in Table 3.3

Table 3.3 Approved Queensland Research Projects

RESEACH AREA	PROJECT	STATUS
Surface and groundwater	Geochemical responses to re injection - understand and quantify aquifer reactions occurring due to re-injection of CSG water, and their impacts on water quality.	Completed
	Re-injection of CSG water - understand, quantify and manage clogging of injection wells during re-injection of CSG water permeates, brines and blends.	Completed
	High performance groundwater modelling - determine the feasibility of large scale re-injection schemes.	Completed
	Isotope and geochemical groundwater baseline study - characterise the baseline geochemistry of groundwater and formation water prior to and during initial stages of development to understand groundwater age and origin.	Completed
	Hydrocarbons in groundwater, Surat and Bowen basins - review and assess the presence of organic compounds in groundwater found in the Surat and Bowen basins using existing open source and company held data.	Completed
	Constraining water flows in the Surat Basin - measuring and modelling specific chemicals called environmental tracers to gain a better understanding of the speed and direction of groundwater flow.	Completed
	Groundwater contamination risk assessment - assess the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage.	Completed
	Air, water and soil impacts of hydraulic fracturing (Phase 1) - to design an intensive monitoring campaign that will measure the air, water and soil impacts of hydraulic fracturing of production wells in the Surat Basin.	Completed
	Air, water and soil impacts of hydraulic fracturing (Phase 2) - undertake 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.	Completed
	Cooper Creek flood modelling scenarios - to deliver outputs from targeted flood modelling scenarios developed in response to on-going engagement with stakeholders in the Cooper GBA region	Underway
Social and economic	Monitoring regional transition - synthesise existing knowledge on the nature of rural socio-economic transitions occurring as a result of resource developments, and track the social impacts of regional economic change.	Completed
	Community functioning and well-being - identify principal indicators of community function and well-being, the resources and strategies necessary for enabling and enhancing community responses, and how communities respond to major developments in their region.	Completed

RESEACH AREA	PROJECT	STATUS
Social and Economic	Economic assessment and forecasting project -understand future impacts on regional economies and how local businesses can respond.	Completed
	Understanding community aspirations - identify community aspirations and their overlaps and/or disparities with existing resources, industry, and policy trajectories. Specifically, to understand how different community segments see the future of the region and how these reflect the economic and policy avenues for the region.	Completed
	Community function and well-being survey 2 - conduct a community well-being survey to measure the changes since the end of the construction and start of the operations phases and compare results with the Survey 1 in 2014.	Completed
	Trends in community wellbeing and attitudes to CSG development – Survey 3 - monitoring and communicating the changes and trends in community wellbeing, resilience and attitudes to CSG development across different phases of industry operation in south west Queensland, and identifies how these vary between the construction, post-construction, and operations phases of development.	Completed
	Community wellbeing and attitudes to CSG development - 2014 to 2024 – Survey 4 - Identifying trends in community wellbeing and attitudes to CSG development in south-west Queensland - from the construction phase to a fully operational phase.	Underway
	Evaluating medium-term socio-economic impacts of onshore gas activity in Southern Queensland - study a range of potential positive and negative social, demographic and economic impacts that are commonly linked to onshore natural gas extraction activity, across the regions of the Surat and Bowen basins, in southern Queensland.	Underway
Greenhouse gases and air quality	Methane seepage in the Surat Basin - detect and measure methane seeping from underground in the Surat Basin, and identify sources of methane to provide a baseline of methane emissions on a regional scale.	Completed
	Greenhouse gas emission assessment of the Surat Basin Gas Reserve - analysis of the whole of life cycle GHG emissions, including extraction, transportation and usage of CSG in the Surat Basin.	Completed
	Ambient air quality in the Surat Basin - comprehensive assessment of air quality in the Surat Basin region in Queensland using air quality measurement network and modelling.	Completed
	Methane contributions from holding ponds - A desktop study to identify emissions potential and controls in CSG holding ponds and aquatic systems in Queensland	Near completion
	Addressing knowledge gaps on key controls or contributors to methane emissions from CSG water holding ponds in the Surat Basin, Queensland - the data will focus on the role that methane generating and eating microbes, algae, brine and sediment play in the methane emission contributions of water holding ponds.	To commence in 23/24

RESEACH AREA	PROJECT	STATUS
Greenhouse gases and air quality	Comprehensive survey of methane emissions from Queensland coal seam gas water holding ponds in the Surat Basin - select multiple representative CSG holding ponds to accurately quantify methane emissions, in both summer and winter, using rigorous sampling methods to minimise known methane measurement limitations.	To commence in 23/24
	Using carbon and hydrogen isotopes to fingerprint sources of methane emissions from the Western Downs Region in the Surat Basin, Queensland - conduct isotopic fingerprinting of methane at various sites (including gas industry, agricultural, wastewater treatment, swamps, natural seeps, landfills).	To commence in 23/24
Agriculture	Preserving agricultural productivity - assist in the preservation of agricultural productivity during land use change.	Completed
	Shared space - understand how farmers from a range of production systems (extensive grazing to intensive cropping) perceive and value CSG developments on their and others' farms.	Completed
	Gas farm design - understand how to design farms for a new mixed land use.	Completed
	Making tracks, treading carefully - understand the direct and indirect impacts of tracks and traffic on invasive species and erosion in agricultural landscapes.	Completed
	Without a trace - identify the nature and likely extent of damage to agricultural soils, and methods for avoiding and improving soils.	Completed
	Telling the story - Share understanding of changes on farms and in towns during CSG development in the Surat area.	Completed
	CSG and Livestock – Inside the Herd - monitoring grazing land with CSG infrastructure to better understand the impacts of CSG infrastructure, traffic and dust on animals and pastures.	Completed
Biodiversity	Priority threat identification, management and appraisal - identify and understand the broad range of existing and new threats to biodiversity across a CSG development region.	Completed
	Fire ecology of grassy woodlands - determine the sensitivity of the region's flora and fauna to changed fire regimes, and the thresholds at which changed fire regimes cause substantial ecological impact.	Completed
	Habitat selection by two focal species - study two species, the Golden-tailed gecko and Glossy black-cockatoo, to assess the range of impacts from CSG development in south-west Queensland on their habitat.	Completed
	Ensuring biodiversity offset success: the right kind of seed for a rare daisy - Identify genetic and demographic factors that may limit the success of establishing a rare daisy (*Rutidosis lantana*) in a new location.	Completed

RESEACH AREA	PROJECT	STATUS
Biodiversity	Guidelines for offset population sizes - improve the understanding of how ecological and biological traits of rare species of plants, commonly encountered in restoration projects, and different environmental factors determine viable population sizes by using computer models.	Completed
	Sustaining turtles and their homes - understand how sediments from dredging and discharges affect seagrass and turtles.	Completed
Health	Potential health impacts from CSG - establish processes and governance to ensure research quality, define the project boundary, conduct hazard identification and exposure pathways, and screen data.	Completed
	Exposure assessment of identified chemicals used in CSG activities - screen and appraise the ~50 chemicals, and conduct microbial degradation trials to identify persistent chemicals requiring further in-depth assessment. Undertake a comprehensive sampling campaign at specific wells and surface water bodies to determine the presence or absence of these COPCs.	Underway
	Analysis of dust near CSG sites to assess potential for respirable crystalline silica - assess current composition of dust and size distributions of the different constituents in the study area to determine the abundance of RCS. Results will be compared against samples collected at the same time from reference sites which are not impacted by the CSG operation.	Underway
Land and Infrastructure	Queensland CSG well integrity: cements, steels and microbial activity - bring together current and historic information on steels, cements and microbial processes that may impact CSG well integrity.	Underway

3.1.3 Queensland Research Progress and Expenditure

The committed Queensland research budget, expenditure and milestones completed for each project is provided in Table 3.4 (* = completed projects).

Table 3.4 Committed research investment, expenditure and progress in Queensland, by project

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[6]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
Surface and groundwater	Geochemical responses to re-injection*	$1,061,242	$1,126,356	106%	100%
	Re-injection of CSG water*	$1,039,989	$1,085,085	104%	100%
	High performance groundwater modelling*	$928,215	$1,024,173	110%	100%
	Isotope and geochemical groundwater baseline study*	$667,053	$709,848	106%	100%
	Hydrocarbons in groundwater, Surat & Bowen basins*	$257,694	$568,722	221%	100%
	Constraining groundwater flow models*	$588,957	$732,651	124%	100%
	Water contamination risk assessment on hydraulic fracturing in unconventional gas extraction*	$290,624[7]	$293,542	101%	100%
	Air, water and soil impacts of hydraulic fracturing (Phase 1)*	$330,795[8]	$351,433	106%	100%
	Air, water and soil impacts of hydraulic fracturing (Phase 2)*	$2,111,055[9]	$2,153,095	102%	100%
	Cooper Creek flood modelling scenarios	$503,797	$197,108	39%	50%
Social and economic	Monitoring regional transition*	$376,088	$404,084	107%	100%
	Community functioning and well-being*	$417,438	$457,314	110%	100%
	Economic assessment and forecasting project*	$296,508	$299,971	101%	100%
	Understanding community aspirations*	$342,692	$341,821	100%	100%
	Community function and well-being survey 2*	$180,479	$190,269	105%	100%

[6] Any expenditure exceeding 100% represents an additional CSIRO contribution.

[7] This is a jointly funded QLD and NSW project. The figures presented in this table are for 'total project costs' and not split by region.

[8] This includes $245,670 contribution from APLNG (separate from membership).

[9] This includes $1,285,000 contribution from APLNG (separate from membership).

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[6]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
	Trends in community wellbeing and attitudes to CSG development - survey 3*	$240,474	$243,795	101%	100%
	Community wellbeing and attitudes to CSG development – 2014 to 2024	$462,426	$29,764	6%	0%
	Evaluating medium-term socio-economic impacts of onshore gas activity in Southern Queensland	$290,779	$119,616	41%	40%
Greenhouse gases and air quality	Methane seepage in Surat Basin*	$2,015,937[10]	$2,293,692	114%	100%
	Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve*	$241,708	$318,256	132%	100%
	Ambient air quality in the Surat Basin*	$541,771	$605,517	112%	100%
	Methane contributions from holding ponds (Phase 1)	$126,104	$112,504	89%	0%
	Key controls or contributors to methane emissions from CSG water holding ponds (Phase 2)	$394,771	0%[11]	0%	0%
	Methane emissions from CSG water holding ponds in Queensland (Phase 2)	$325,411	0%[12]	0%	0%
	Sources of methane emissions from the Western Downs Region	$480,388	0%[13]	0%	0%
Agriculture	Preserving agricultural productivity*	$547,756	$538,532	98%	100%
	Shared space*	$140,445	$138,805	99%	100%
	Gas farm design*	$651,329	$626,057	96%	100%
	Making tracks, treading carefully*	$564,089	$578,197	103%	100%
	Without a trace*	$339,990[14]	$339,990	100%	100%
	Telling the story*	$332,224	$329,234	99%	100%
	CSG & Livestock- Inside the herd*	$233,333	$239,628	103%	100%
Biodiversity	Priority threat identification, management and appraisal*	$945,400	$995,144	105%	100%
	Fire ecology of grassy woodlands*	$789,042	$840,016	106%	100%

[10] This includes $1,121,707 combined contribution from APLNG, QGC, Santos and Arrow (separate from membership).

[11] This is a newly approved project. Expenditure will be incurred in 2023/24.

[12] This is a newly approved project. Expenditure will be incurred in 2023/24.

[13] This is a newly approved project. Expenditure will be incurred in 2023/24.

[14] This includes $79,990 in-kind contribution from USQ.

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[6]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
	Habitat selection by two focal species*	$167,432	$204,990	122%	100%
	Ensuring biodiversity offset success: the right kind of seed for a rare daisy*	$198,055	$225,232	114%	100%
	Guidelines for offset population sizes*	$198,630	$200,326	101%	100%
	Sustaining turtles and their homes*	$1,693,199	$1,802,905	106%	100%
Health	Potential health impacts from CSG*	$1,124,423	$1,128,787	100%	100%
	Exposure assessment of identified chemicals used in CSG activities	$597,742	$104,058	17%	10%
	Analysis of dust near CSG sites to assess potential for respirable crystalline silica	$577,203	$35,866	6%	0%
Land and infrastructure	Queensland CSG well integrity: cements, steels and microbial activity	$375,693	$192,039	51%	14%
TOTAL ALLOCATED BUDGET		**$23,799,475**			

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

3.2 Queensland research ideas being discussed for 2023/24

The following project ideas (Table 3.5) are being discussed but are yet to be ratified and are subject to review by the relevant Research Advisory Committee. Over coming months further stakeholder consultation will occur aiming to prioritise these research ideas in relation to other community issues.

Table 3.5 Future research ideas in Queensland for 2023/24

RESEARCH AREA	IDEA	BASIN	ESTIMATED COST
Land and Infrastructure	This project would extend on the findings of the 'Queensland CSG well integrity: cements, steels and microbial activity' project to look at the time dependent integrity of cement used in well completion in the Surat and Bowen Basins in Queensland.	Multiple	$350K
Greenhouse Gas	This project will look at gas found in aquifers below the main gas resource in the Surat Basin to determine its origin.	Surat	$250k

4 NSW R&D Plan & Budget

4.1 NSW Investment profile

4.1.1 Committed research investment for 2016/17-2026/27

The committed budget for projects in New South Wales for 2016/17-2026/27 now stands at $7,331,502. A breakdown of the committed research budget across the various research subject areas is provided in Table 4.1 and Table 4.2 shows the investment committed by contributor.

Table 4.1 Committed research investment in NSW by research subject area, 2016/17-2026/27

RESEARCH AREA	TOTAL RESEARCH INVESTMENT
Water (62%)	**$4,558,343**
Social & economic (21%)	**$1,544,020**
Biodiversity (11%)	**$801,252**
Health (4%)	**$272,524**
Greenhouse gas and air quality (2%)	**$155,363**
TOTAL	**$7,331,502**

Table 4.2 Committed research investment in NSW by contributor, 2016/17-2026/27

CONTRIBUTOR	CONTRIBUTION TYPE	TOTAL RESEARCH CONTRIBUTION
Federal Government (57%)	Grant	**$4,158,944**
NSW Government (12%)	Grant	**$908,143**
CSIRO (24%)	In-kind	**$1,728,049**
Santos (4%)	GISERA Membership	**$315,229**
AGL (3%)	GISERA Membership	**$221,137**
TOTAL		**$7,331,502**

4.1.2 NSW Current Research Portfolio

A summary of all approved research projects in NSW is provided in Table 4.3

Table 4.3 Approved NSW Research Projects

RESEACH AREA	PROJECT	STATUS
Surface and Groundwater	Impacts of CSG depressurization on Great Artesian Basin flux - improve the understanding of the GAB groundwater flow in the Pilliga region through integration of existing information from models, hydrochemical data and environmental tracers.	Completed
	Spatial design of groundwater monitoring network in the Narrabri Gas Project area - analysis and design of groundwater bore networks for optimal groundwater monitoring and early detection of changes.	Completed
	Improving groundwater models to better represent coal seam gas extraction impacts in the Namoi region - develop more representative models for estimating the groundwater impacts from coal seam gas well fields.	Completed
	Groundwater contamination risk assessment - Assess the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage.	Completed
	Assessment of faults as potential connectivity pathways - improve understanding of sub-surface structures and potential fault zones that may act as pathways between target coal seams and shallow aquifers or surface water systems, and by helping to further improve the accuracy of future groundwater models in the Narrabri region.	Completed
	Microbial communities and their ability to degrade prospective chemicals used in coal seam gas activities - this research will help improve understanding of the fate of chemical compounds used in coal seam gas (CSG) activities in the region if these compounds were to come into contact with the environment.	Underway
	Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers - this project will further improve our knowledge of groundwater systems in the Gunnedah and Surat Basins in the Narrabri region and refine the conceptual understanding of potential for hydrogeological connectivity pathways between shallow aquifers.	Underway
	Groundwater modelling and predictive analysis to inform CSG impact assessment, monitoring and management - this project will undertake independent groundwater modelling and predictive analyses to inform coal seam gas groundwater impact assessment and regulatory monitoring and management in the Narrabri Gas Project area.	Underway
	Review of beneficial reuse or end-use options for brine from the Narrabri Gas Project region - collate existing data on brine and salt management in the region; review existing and emerging technologies and solutions; analyse the costs and benefits of brine reuse and end-use options.	Underway

RESEACH AREA	PROJECT	STATUS
Social and Economic	Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations - identify current levels and trajectories of economic, social and demographic variables in CSG regions within NSW and analyse whether or not the CSG industry could change the trajectory of these variables.	Completed
	Social baseline assessment of the Narrabri region of NSW in relation to CSG development - Understand and measure attitudes, perceptions and expectations that exist within the community with respect to CSG development, and current levels of community wellbeing and community resilience.	Completed
	Decommissioning pathways for CSG projects - Review regulatory frameworks in relation to principles derived from international literature and consider social concerns with regard to decommissioning of wells and well pad infrastructure.	Completed
	Assessing and projecting on-shore gas effects on regional economic activity - this project will analyse the influence of the NSW on-shore gas industry on regional economic and social indicators, and use economic models to generate descriptions of potential future effects for NSW.	Completed
	Monitoring community wellbeing and attitudes to CSG in Narrabri (pre-construction phase) - this project will monitor any changes in local community wellbeing and attitudes to coal seam gas (CSG) during the pre-construction phase of the Santos Narrabri Gas Project in NSW.	Underway
	Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase)[15] - this project will monitor any changes in local community wellbeing and attitudes to coal seam gas (CSG) during the construction phase of the Santos Narrabri Gas Project in NSW.	To commence in 24/25
Greenhouse gases and air quality	Regional Methane Emissions in NSW CSG Basins - this project will identify and quantify methane emission sources such as CSG infrastructure, feedlots, coal mining, legacy bore holes in the Pilliga region.	Completed
Health	Potential human health effects of coal seam gas (study framework) - review current information to design a study on the health effects of CSG activities based on community stakeholder, governmental, expert consultation group, and industry input.	Completed
Biodiversity	Remote sensing and threatened species surveys to better understand risks of forest fragmentation from the Narrabri Gas Project - determine how fragmentation resulting from NGP land clearing activities will add to the existing impacts from prior land use fragmentation on biodiversity in the region.	Underway

[15] This research project is contingent on the construction phase of gas development in the Narrabri Shire commencing.

4.1.3 NSW Research Progress and Expenditure

The committed New South Wales research budget, expenditure and milestones completed for each project is provided in Table 4.4 (* = completed projects).

Table 4.4 Committed research investment, expenditure and progress in NSW, by project

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[16]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
Surface and groundwater	Impacts of CSG depressurisation on the Great Artesian Basin flux*	$429,859	$429,859	100%	100%
	Data- worth analysis and spatial design of groundwater monitoring networks in the NGP area*	$216,218	$217,613	101%	100%
	Improving groundwater models to better represent CSG extraction impacts in Namoi region*	$301,295	$301,834	100%	100%
	Water contamination risk assessment on hydraulic fracturing in unconventional gas extraction*	$290,624[17]	$293,542	101%	100%
	Assessment of faults as potential connectivity pathways*	$234,930	$235,462	100%	100%
	Microbial communities and their ability to degrade prospective chemicals used in CSG activities	$545,271	$321,421	59%	43%
	Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers	$1,124,719	$148,923	13%	25%
	Groundwater modelling and predictive analysis to inform CSG impact assessment, monitoring and management	$1,194,385	$209,712	18%	9%
	Review of beneficial reuse or end-use options for brine from the NGP region	$322,760	$83,089	26%	0%
Social and economic	Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations*	$103,694	$103,694	100%	100%
	Social baseline assessment of the Narrabri region of NSW in relation to CSG development*	$272,292	$320,467	118%	100%
	Decommissioning CSG Wells*	$298,876	$299,012	100%	100%

[16] Any expenditure exceeding 100% represents an additional CSIRO contribution.

[17] This is a jointly funded QLD and NSW project. The figures presented in this table are for 'total project' and not split by region.

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[16]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
	Assessing and projecting onshore gas effects on regional economic activity*	$258,883	$258,882	100%	100%
	Monitoring community wellbeing and attitudes to CSG in Narrabri (pre-construction phase)	$320,885	$125,150	39%	40%
	Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase)	$289,388[18]	$0	0%	0%
Greenhouse gases and air quality	Regional methane emissions in NSW CSG basins*	$155,363	$155,363	100%	100%
Biodiversity	Remote sensing and threatened species surveys to better understand risks of forest fragmentation from the NGP	$801,252	$123,787	15%	0%
Health	Human Health effects pf Coal Seam Gas Activity Study Design*	$272,524	$317,002	116%	100%
TOTAL ALLOCATED BUDGET		**$7,331,502**			

[18] This research project is contingent on the construction phase of gas development in the Narrabri Shire commencing. If project does not proceed, funds will be returned for future reallocation.

4.2 NSW research ideas being discussed for 2023/24

The following project ideas (Table 4.5) are being discussed but are yet to be ratified and are subject to review by the relevant Research Advisory Committee. Over coming months further stakeholder consultation will occur aiming to prioritise these research ideas in relation to other community issues.

Table 4.5 Future research ideas in NSW for 2023/24

RESEARCH AREA	IDEA	BASIN	ESTIMATED COST
Land and Infrastructure	A unique opportunity may exist to study the legacy of a CSG development at final stages of decommissioning in Camden.	Camden	$250-400K

5 South Australia R&D Plan & Budget

5.1 South Australia Investment profile

5.1.1 Committed research investment for 2018/19 - 2023/24

The committed budget for projects in South Australia for 2018/19-2023/24 now stands at $2,670,270. A breakdown of the committed research budget across the various research subject areas is provided in Table 5.1 and Table 5.2 shows the investment committed by contributor.

Table 5.1 Committed research investment in South Australia by research subject area, 2018/19-2023/24

RESEARCH AREA	TOTAL RESEARCH INESTMENT
Water (56%)	**$1,484,564**
Social & economic (28%)	**$759,310**
Agriculture (16%)	**$426,396**
Total	**$2,670,270**

Table 5.2 Committed research investment in South Australia by contributor, 2018/19-2023/24

CONTRIBUTOR	CONTRIBUTION TYPE	TOTAL RESEARCH CONTRIBUTION
Federal Government (46%)	Grant	**$1,225,787**
SA Government (29%)	Grant	**$782,607**
CSIRO (25%)	In-kind	**$661,876**
Total		**$2,670,270**

5.1.2 South Australia Current Research Portfolio

A summary of all approved research projects in South Australia is provided in Table 5.3.

Table 5.3 Approved South Australia Research Projects

RESEACH AREA	PROJECT	STATUS
Surface and Groundwater	Onshore gas and water contamination: causes, pathways and risks - investigate potential groundwater contamination causes, pathways and vulnerability to understand onshore gas water quality impacts for southeast SA.	Completed
	Groundwater balance in gas development regions of South East South Australia - improve groundwater balance models in the onshore gas development regions of south east South Australia.	Completed
	Microbial degradation of chemical compounds used in onshore gas production in the SE of South Australia - understand the biodegradation of certain chemical compounds used in onshore gas production in the south-east of South Australia.	Completed
	Microbial degradation of chemicals and fluids in aquifers of the Limestone Coast, SA - demonstrate the potential for microbial degradation of chemicals used by the onshore gas industry across the Tertiary Limestone Aquifer (TLA) in the Limestone Coast region of south east South Australia.	Near completion
	Decision support framework for future groundwater development scenarios in the southeast SA - develop and test a decision support framework to improve management of groundwater resources. Research outcomes will consider probable future groundwater use scenarios, taking account of climate change and various future water use patterns for irrigation, forestry, onshore gas and other industries in the south east of South Australia.	Completed
Social and Economic	Community wellbeing and attitudes to conventional gas development in the South East of South Australia - measure levels of perceived risk, benefits, knowledge, and other underlying drivers of trust and social acceptance of conventional gas development in South Australia's south east, and develop baseline data on community values, well-being and future expectations.	Completed
	Assessing the value of locally produced conventional gas in SA's South East - 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.	Completed
	The role of gas in South Australia - clarify the role of natural gas in meeting the state's renewable energy, security, emissions and energy pricing goals.	Completed
Agriculture	Gas impacts and opportunities on primary industries - analyse possible impacts and opportunities from gas development for rural areas in South Australia's south east.	Completed
	Perspectives on risk to local markets and industries - explore potential market impacts and associated concerns relating to the value of place of origin labelling and branding arising from conventional gas development in the south east of SA.	Completed

5.1.3 South Australia Research Progress and Expenditure

The committed South Australia research budget, expenditure and milestones completed for each project is provided in Table 5.4. (* = completed projects).

Table 5.4 Committed research investment, expenditure and progress in South Australia, by project

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[19]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
Surface and Groundwater	Onshore gas and water contamination: causes, pathways and risks*	$277,550	$280,170	101%	100%
	Groundwater balance in gas development regions of south east South Australia*	$326,036	$327,994	101%	100%
	Microbial degradation of chemical compounds used in onshore gas production in the south east of South Australia*	$240,604	$244,834	102%	100%
	Microbial degradation of chemicals and fluids in aquifers of the Limestone Coast, South Australia	$273,502	$263,713	96%	85%
	Decision support framework for future groundwater development scenarios in the southeast South Australia*	$366,872	$366,264	100%	100%
Social and Economic	Community wellbeing and attitudes to conventional gas development in the south east of South Australia*	$198,500	$198,606	100%	100%
	Assessing the value of locally produced conventional gas in SA's South East*	$238,480	$238,667	100%	100%
	The role of gas in South Australia*	$322,330	$323,573	100%	100%
Agriculture	Gas impacts and opportunities on primary industries*	$175,133	$178,089	102%	100%
	Perspectives on risk to local markets and industries*	$251,263	$251,263	100%	100%
TOTAL ALLOCATED BUDGET		**$2,670,270**			

[19] Any expenditure exceeding 100% represents an additional CSIRO contribution.

5.2 South Australia research ideas being discussed for 2023/24

The following project ideas (Table 5.5) are being discussed but are yet to be ratified and are subject to review by the relevant Research Advisory Committee. Over coming months further stakeholder consultation will occur aiming to prioritise these research ideas in relation to other community issues.

Table 5.5 Future research ideas in SA for 2023/24

RESEARCH AREA	IDEA	BASIN	ESTIMATED COST
Greenhouse Gas	There is potential to examine the role of natural gas in the in south-east South Australia in conjunction with other fuels, such as hydrogen production, with storage of CO2 under-ground. Development of such a project would depend on scenarios of potential future development and levels of community interest among other priorities	Otway	$200-300K

6 Northern Territory R&D Plan & Budget

6.1 Northern Territory Investment profile

6.1.1 Committed research investment for 2018/19 - 2024/25

The committed budget for projects in Northern Territory for 2018/19-2024/25 now stands at $8,835,569. A breakdown of the committed research budget across the various research subject areas is provided in Table 6.1 and Table 6.2 shows the investment committed by contributor.

Table 6.1 Committed research investment in Northern Territory by research subject area, 2018/19-2024/25

RESEARCH AREA	TOTAL RESEARCH INVESTMENT
Surface and Groundwater (57%)	**$5,032,707**
Greenhouse gases and air quality (19%)	**$1,719,864**
Land and Infrastructure (10%)	**$874,230**
Biodiversity (9%)	**$774,011**
Agriculture (3%)	**$240,449**
Social & economic (2%)	**$194,308**
Total	**$8,835,569**

Table 6.2 Committed research investment in Northern Territory by contributor, 2018/19-2024/25

CONTRIBUTOR	CONTRIBUTION TYPE	TOTAL RESEARCH CONTRIBUTION
Federal Government (53%)	Grant	**$4,640,495**
NT Government (13%)	Grant	**$1,151,939**
CSIRO (21%)	In-kind	**$1,841,200**
Santos (6%)	GISERA membership	**$559,856**
Origin (5%)	GISERA membership	**$464,783**
Pangaea (1%)	GISERA membership	**$123,438**
Charles Darwin University (1%)	In-kind contribution to project W18 (Characterisation of the Stygofauna and microbial assemblages of the Beetaloo Sub-basin)	**$53,858**
Total		**$8,835,569**

6.1.2 Northern Territory Current Research Portfolio

A summary of all approved research projects in Northern Territory is provided in Table 6.3.

Table 6.3 Approved Northern Territory Research Projects

RESEACH AREA	PROJECT	STATUS
Surface and Groundwater	Baseline monitoring of groundwater properties in the Beetaloo Sub-basin, NT - understand the geochemical properties, recharge rates and recharge mechanisms of groundwater.	Completed
	Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids - better understand how typical onshore gas chemicals biodegrade in relevant aquifers and soil types in the Northern Territory.	Completed
	Improved approaches to long-term monitoring of decommissioned onshore gas wells - investigate options for long-term monitoring of well integrity in decommissioned onshore gas wells in the Northern Territory, including assessment of well decommissioning practices and monitoring techniques and technology, in the context of Northern Territory regulatory requirements	Completed
	Onshore gas water lifecycle management options framework - design an options framework and decision criteria for water and wastewater management for Northern Territory onshore gas development.	Completed
	Fate of hydraulic fracturing fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface - provide a systems-based approach to understanding chemicals and their lifecycle during hydraulic fracturing, in flow-back water produced after fracturing, and in tanks and ponds in industry facilities in the Northern Territory.	Near completion
	Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT - To undertake a broad spatial pilot-scale survey of water bores in the Beetaloo Sub-basin, using direct sampling and DNA-based approaches to determine the distribution and abundance of stygofauna and characterise subterranean groundwater-dependent ecosystems.	Completed
	Examination of stygofauna ecosystems of the Beetaloo Sub-basin - this research aims to build an understanding of the extent to which stygofauna present in bores reflect their presence more widely within aquifers. It also aims to understand the physical and chemical drivers that may determine where stygofauna exist and how communities may be connected.	Underway
	Environmental baseline characterisation of the springs in Hot Springs Valley, NT - conduct a field campaign to collect detailed data on the geology, hydrogeology and ecology of the Hot Springs Valley to augment data collected in previous surveys.	To commence in 2023/24
Social and Economic	Mapping future transport passages and volumes for improved planning and operation - Using scenarios of both construction and operational phases of gas	Completed

RESEACH AREA	PROJECT	STATUS
	development, this project will analyse road and rail freight costs, flows and impacts for identified sites and regions in the Beetaloo Sub-basin in the NT. It will also test a range of interventions that may increase road safety while reducing costs and impacts on the environment and local communities.	
Greenhouse gases and air quality	Baseline measurement and monitoring of methane emissions in the Beetaloo Sub-basin - Understanding of the natural methane levels, over the various seasons, a baseline for accurately quantifying any future onshore gas impacts.	Completed
	Mitigating Fugitive Gas Emissions from Well Casings - review current industry practice and conduct experimental investigations to evaluate techniques and assess new materials designed to minimise fugitive methane emissions leaking from microfractures and gaps in gas well cement casing	Completed
	Offsets for Life cycle Greenhouse Gas Emissions of Onshore Gas in the NT - seek feasible options to offset life cycle greenhouse gas (GHG) emissions emitted in Australia associated with scenarios of new production and Australian consumption of onshore gas extracted from the NT Beetaloo Sub-basin.	Completed
	Methane emissions quantification of well drilling to completion processes in Beetaloo sub-basin - use autonomous emissions monitoring stations to quantify fugitive methane emissions from well construction and completion activities from unconventional shale petroleum exploration in the Beetaloo sub-basin. Results from this study will compare actual measured results with estimated results to verify the adequacy of existing calculated emission estimates.	Underway
Agriculture	Putting land management knowledge into practice - develop high-quality spatial data to help landholders, regulators, and the gas industry to evaluate design and placement of gas infrastructure, protect surface water and vegetation, and reduce erosion, soil damage and dust.	Near completion
Biodiversity	Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo - investigate how roads, pipelines and other linear transport infrastructure may impact biodiversity in the Beetaloo Sub-basin during the development of an onshore gas industry.	Near completion
	UAV–LiDAR and spaceborne remote sensing for site survey and habitat condition monitoring in the Beetaloo - develop a scalable approach for monitoring the structural condition of vegetation in the Beetaloo Sub-basin.	To commence in 2023/24
Land and Infrastructure	Background Seismicity of Beetaloo Sub-Basin and Seismic Hazard – this project will establish long-term background seismic data to characterise the current natural seismic activity in the Beetaloo Sub-basin in the Northern Territory. This baseline data can then be used to distinguish any possible increases in seismic activity resulting from future gas development and operations in the region.	Underway
	Beetaloo basin shale long-term competency after decommissioning – this project aims to quantify the self-sealing competency of shales in the Beetaloo basin that sit between the target natural gas seams and the shallow Cambrian Limestone Aquifer.	Underway

6.1.3 Northern Territory Research Progress and Expenditure

The committed Northern Territory research budget, expenditure and milestones completed for each project is provided in Table 6.4 (* = completed projects).

Table 6.4 Committed research investment, expenditure and progress in Northern Territory, by project

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT [20]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
Surface and Groundwater	Baseline monitoring of groundwater properties in the Beetaloo Sub-basin, NT*	$410,550	$410,550	100%	100%
	Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin*	$346,890[21]	$346,909	100%	100%
	Improved approaches to long-term monitoring of decommissioned onshore gas wells*	$352,436	$356,346	101%	100%
	Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids*	$291,964	$297,923	102%	100%
	Onshore gas water lifecycle management options framework*	$393,945	$393,945	100%	100%
	Fate of hydraulic fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface	$821,200	$755,480	92%	83%
	Examination of stygofauna ecosystems of the Beetaloo Sub-basin	$1,730,258	$366,016	21%	25%
	Environmental baseline characterisation of the springs in Hot Springs Valley, NT	$685,463	$0[22]	0%	0%
Greenhouse gases and air quality	Baseline measurement and monitoring of methane emissions in the Beetaloo Sub-basin*	$305,297	$311,931	102%	100%
	Mitigating fugitive gas emissions from well casings*	$238,249	$239,557	101%	100%
	Offsets for Life cycle Greenhouse Gas Emissions of Onshore Gas in the NT*	$417,884	$430,023	103%	100%

[20] Any expenditure exceeding 100% represents an additional CSIRO contribution.

[21] This includes $53,858 in-kind contribution from CDU.

[22] This is a newly approved project. Expenditure will be incurred in 2023/24.

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT [20]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
	Methane emissions quantification of well drilling to completion processes in Beetaloo Sub-basin	$758,434	$491,004	65%	33%
Agriculture	Putting land management knowledge into practice	$240,449	$240,449	100%	75%
Biodiversity	Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo	$319,520	$320,621	100%	86%
	UAV–LiDAR and spaceborne remote sensing for site survey and habitat condition monitoring in the Beetaloo	$454,491	$0[23]	0%	0%
Social and Economic	Mapping future transport passages and volumes for improved planning and operation*	$194,308	$194,450	100%	100%
Land and Infrastructure	Background Seismicity of Beetaloo Sub-Basin and Seismic Hazard	$451,882	$250,083	55%	25%
	Beetaloo basin shale long-term competency after decommissioning	$422,348	$233,861	55%	33%
TOTAL ALLOCATED BUDGET		**$8,835,569**			

[23] This is a newly approved project. Expenditure will be incurred in 2023/24.

6.2 Northern Territory research ideas being discussed for 2023/24

The following project ideas (Table 6.5) are being discussed but are yet to be ratified and are subject to review by the relevant Research Advisory Committee. Over coming months further stakeholder consultation will occur aiming to prioritise these research ideas in relation to other community issues.

Table 6.5 Future research ideas in Northern Territory for 2023/24

SUBJECT AREA	IDEA	BASIN	ESTIMATED COST
Surface and Groundwater	An integrated project to understand surface water features of the Beetaloo region and potential connections with shallow groundwater systems that support them. The project would consider environmental and cultural significance of these water features, and the potential for interaction with unconventional gas activities.	Beetaloo	$1.2M
Socio-economic pathways	This project would look at desirable outcomes for local communities (such as employment and infrastructure) if the development of an onshore gas industry in the Beetaloo region occurs.	Beetaloo	$400k

7 Western Australia R&D Plan & Budget

7.1 Western Australia Investment profile

7.1.1 Committed research investment for 2020/21-2024/25

The committed budget for projects in Western Australia for 2020/21-2024/25 now stands at $2,288,680. A breakdown of the committed research budget across the various research subject areas is provided in Table 7.1 and Table 7.2 shows the investment committed by contributor.

Table 7.1 Committed research investment in Western Australia by research subject area, 2024/25

RESEARCH AREA	TOTAL RESEARCH INVESTMENT
Land and Infrastructure (94%)	**$2,138,181**
Water (4%)	**$99,275**
Biodiversity (2%)	**$51,224**
Total	**$2,288,680**

Table 7.2 Committed research investment in Western Australia by contributor, 2024/25

CONTRIBUTOR	CONTRIBUTION TYPE	TOTAL RESEARCH CONTRIBUTION
CSIRO (15%)	In-kind	**$352,350**
Federal Government (21%)	Grant	**$481,530**
Geological Survey of Western Australia (51%)	In-kind contribution to project W25 (Baseline seismic monitoring of the Canning Basin)	**$1,154,800**
Geoscience Australia (13%)	In-kind contribution to project W25 (Baseline seismic monitoring of the Canning Basin)	**$300,000**
Total		**$2,288,680**

7.1.2 Western Australia Current Research Portfolio

A summary of all approved research projects in Western Australia is provided in Table 7.3.

Table 7.3 Approved Western Australia Research Projects

RESEACH AREA	PROJECT	STATUS
Surface and Groundwater	Groundwater baseline study of the Canning Basin, Western Australia – explores and summarises the current state of knowledge of groundwater systems in the Canning Basin, Western Australia.	Completed
Biodiversity	Baseline assessment of the biodiversity of the Canning Basin, Western Australia - assess the current state of knowledge about the biodiversity of the Canning Basin in Western Australia.	Completed
Land and Infrastructure	Baseline seismic monitoring of the Canning Basin, WA - establish a long-term baseline of seismic monitoring data that will characterise the current natural seismic activity and cultural seismic noise within the Canning Basin in Western Australia.	Underway

7.1.3 Western Australia Research Progress and Expenditure

The committed Western Australia research budget, expenditure and milestones completed for each project is provided in Table 7.4. (* = completed projects).

Table 7.4 Committed research investment, expenditure and progress in Western Australia, by project

RESEARCH SUBJECT AREA	PROJECT	ALLOCATED BUDGET	EXPENDITURE	PERCENTAGE OF BUDGET SPENT[24]	PERCENTAGE OF MILESTONES COMPLETED
			UP TO 30 JUNE 2023		
Land and Infrastructure	Baseline seismic monitoring of the Canning Basin	$2,138,181[25]	$1,325,583	62%	22%
Surface and Groundwater	Groundwater baseline study of the Canning Basin, Western Australia*	$99,275	$104,338	105%	100%
Biodiversity	Baseline assessment of the biodiversity of the Canning Basin, Western Australia*	$51,224	$51,221	100%	100%
TOTAL ALLOCATED BUDGET		**$2,288,680**			

[24] Any expenditure exceeding 100% represents an additional CSIRO contribution.

[25] This includes $1,154,800 in-kind contribution from GSWA and $300,000 in-kind contribution from GA.

7.2 Western Australia research ideas being discussed for 2023/24

The following project ideas (Table 7.5) are being discussed but are yet to be ratified and are subject to review by the relevant Research Advisory Committee. Over coming months further stakeholder consultation will occur aiming to prioritise these research ideas in relation to other community issues.

Table 7.5 Future research ideas in Western Australia for 2023/24

SUBJECT AREA	IDEA	BASIN	ESTIMATED COST
Surface and Groundwater	The North Perth Basin has a history of oil and gas exploration. Its proximity to Perth makes it an economic location to provide locally sourced energy. It also has potential to be used for geological activities other than onshore natural gas exploration and production. This might include CCS, UHS, CAES and natural hydrogen exploration – and be impacted by overlying land use (i.e., farming and mining). Growth in onshore wind and solar energy in the region has added further dimensions to land use conflict. This project would seek to evaluate the potential for basin resource conflicts between the growing demand in the region that includes but is not limited to competing land and subsurface use, impacts on groundwater of these resource conflicts and perceptions of best use of land. Stakeholder fatigue has been noted by industry proponents. By conducting a basin resource conflict study the community can be better informed about decisions being made that are highly influenced by the energy transition for their region.	North Perth	$350-550k
Land and Infrastructure	Seismic data acquisition is a core source of data and information for the onshore gas sector. As new acreage is released, companies plan to acquire new or additional data to make decisions on drilling. Acquiring these data can have surface environmental impacts as a result of land clearing, or where access is restricted due to location of other features (wetlands, mines etc.,) which may restrict the survey location and areal extent. This desktop study would identify better solutions for acquiring seismic data with negligible environmental impacts and testing different tools and configurations for acquiring seismic data that can be used to explore more accurately.	North Perth, Canning, Carnarvon Basins	$150k

8 Proposed management and communication budget for 2023/24

Table 8.1 shows GISERA's actual management and communications expenditure during 2011/12 to 2022/23 financial years and the proposed management and communications budget for 2023/24. Table 8.2 summarises actual and planned partner contributions to management and communications for past and current years.

Table 8.1 Proposed management and communications budget, 2023/24 with actual expenditure for 2011/12-2022/23

ITEM	ACTUAL EXPENDITURE	PLANNED EXPENDITURE	TOTAL
	2011/12 - 2022/23	2023/24	
Director, Deputy Director and State Leaders (salary & overheads)	$3,252,668	$394,864	**$3,647,532**
Communication & Engagement team (salary & overheads)	$3,197,342	$606,598	**$3,803,940**
Admin & Executive Officer support (salary & overheads)	$2,473,823	$259,786	**$2,733,609**
Contractors	$369,384	$0	**$369,384**
Travel & accommodation	$467,004	$54,000	**$521,004**
Communication collateral (e.g., factsheets, brochures, infographics, videos & animations)	$163,809	$92,000	**$255,809**
Website update (redesign and rebrand)	$22,810	$0	**$22,810**
Conferences	$90,400	$33,000	**$123,400**
Annual Symposium/Stakeholder & RAC meetings	$86,378	$13,000	**$99,378**
General Expenses & Annual report	$83,257	$9,400	**$92,657**
Public information sessions	$52,494	$20,000	**$72,494**
Media training	$27,743	$2,000	**$29,743**
Printing	$21,804	$1,400	**$23,204**
Office supplies	$12,772	$1,000	**$13,772**
Vodcasts	$3,000	$0	**$3,000**
Auditor	$0	$10,000	**$10,000**
TOTAL	**$10,324,690**	**$1,497,048**	**$11,821,738**

Table 8.2 Partner contributions to management and communications, with actual expenditure for 2011/12-2022/23 and proposed for 2023/24

COMMS & MNGT COSTS CONTRIBUTIONS	ACTUAL CONTRIBUTION	PLANNED CONTRIBUTION	TOTAL
	2011/12 - 2022/23	2023/24	
CSIRO	$3,735,457	$568,878	**$4,304,335**
Federal Govt	$2,444,347	$782,208	**$3,226,555**
NSW Government	$591,857	$0	**$591,857**
SA Government	$217,392	$0	**$217,392**
NT Government	$121,110	$33,684	**$154,794**
APLNG	$1,121,106	$33,684	**$1,154,789**
Santos	$231,667	$33,684	**$265,351**
QGC	$215,543	$11,228	**$226,770**
Origin	$182,349	$33,684	**$216,033**
AGL	$66,409	$0	**$66,409**
Pangaea	$26,607	$0	**$26,607**
TOTAL	**$10,324,690**	**$1,497,048**	**$11,821,738**

9 Communication

9.1 Overview

As gas exploration and development increases in regions around Australia, information about the impacts of the onshore gas industry is being sought by local communities, governments, land-use industries, environmentalists and the wider public. GISERA's accessible and transparent research outcomes are well placed to contribute constructively and objectively to this need.

CSIRO's GISERA plays an important role in providing trusted information about the challenges and opportunities associated with the onshore gas industry. Communication of CSIRO research conducted through GISERA has occurred using a range of traditional and online media channels to reach wider community audiences. A key communication focus was development of innovative online communication products accessible directly by public audiences, for example, the Take a Tour web journey.

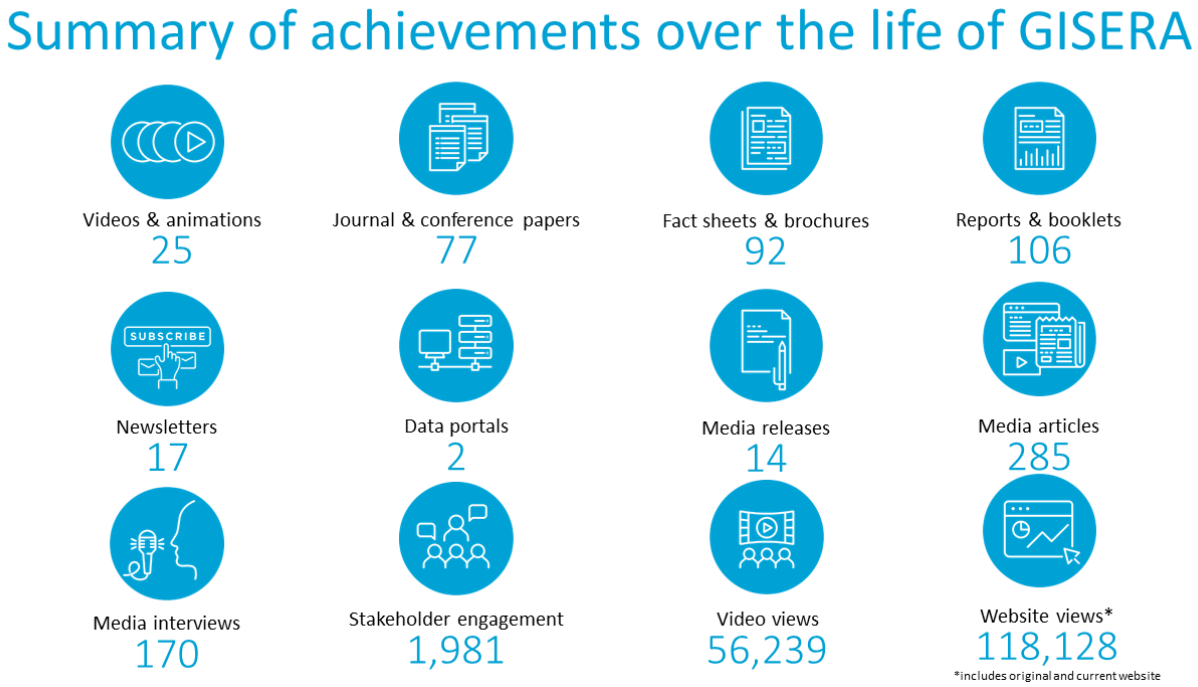

Figure 6 Summary of achievements over life of GISERA

9.2 Communication outputs

A suite of communication channels have been used to ensure effective and meaningful communication of research outcomes. Table 9.1 shows a range of communication outputs GISERA has achieved in 2022/23.

Table 9.1 Summary of technical and general communication outputs in 2022/23

COMMUNICATION PRODUCT	NAME OF COMMUNICATION PRODUCT	STATE / TERRITORY	RELEASE DATE
Article	Putting land management knowledge into practice	NT	July 2022
Fact sheet	Developing flood model scenarios for Cooper Creek	QLD	July 2022
Fact sheet	Analysing seismic activity in the Beetaloo Sub-basin	NT	July 2022
Fact sheet	Groundwater modelling and predictive analysis to inform CSG impact assessment, monitoring and management	NSW	July 2022
Presentation	Community webcast #1 – 10 years of GISERA research	National	August 2022
Article	Mapping out our research	National	August 2022
Article	Community priorities revealed in GISERA survey	National	August 2022
Article	CSIRO soils research recognised by scientific community	QLD	August 2022
Journal Paper	Sorption, degradation and microbial toxicity of chemicals associated with hydraulic fracturing fluid and produced water in soils	QLD	September 2022
Fact sheet	Community wellbeing and attitudes to coal seam gas development in south-west Queensland – 2014 to 2024	QLD	September 2022
Fact sheet	Methane contributions from holding ponds	QLD	September 2022
Fact sheet	Geochemical modelling and geophysical surveys to refine understanding of connectivity between coal seams and aquifers	NSW	September 2022
Fact sheet	Microbial communities and their ability to degrade prospective chemicals used in coal seam gas activities	NSW	September 2022
Fact sheet	Examination of stygofauna ecosystems of the Beetaloo Sub-basin	NT	September 2022
Fact sheet	Investigating Beetaloo Sub-basin shale formations to improve long-term integrity of decommissioned gas wells	NT	September 2022
Fact sheet	The more you look, the more you'll find – measuring seismic activity in WA	WA	September 2022
Interactive Tour and article	Take a tour – ten years of CSIRO's GISERA research	National	September 2022

COMMUNICATION PRODUCT	NAME OF COMMUNICATION PRODUCT	STATE / TERRITORY	RELEASE DATE
Presentation	Community webcast #2 – 10 years of GISERA research	National	October 2022
Presentation	Towards building a baseline seismic catalogue for the Canning Basin at Sub22 Conference	WA	November 2022
Presentation	Australian Groundwater Conference 2022 titled 'Assessing recharge processes and flow dynamics using environmental tracers in the Great Artesian Basin' which highlighted learnings from GISERA project 'Assessment of faults as potential connectivity pathways'	NSW	November 2022
Newsletter	GISERA Newsletter - issue 17	National	December 2022
Final Report	Groundwater in the South East SA under climate change: scenario modelling and stakeholder perspectives of impacts, adaptation and management	SA	December 2022
Fact sheet	Decision support framework for groundwater development scenarios	SA	December 2022
Knowledge transfer presentation	Microbial degradation of chemicals in aquifers of the Limestone Coast, SA	SA	February 2023
Knowledge transfer presentation	Perspectives on risk to local markets and industries	SA	February 2023
Final Report	Mitigation and Offsets of Australian Life Cycle Greenhouse Gas Emissions of Onshore Shale Gas in the Northern Territory	NT	February 2023
Fact sheet	Offsets for Australian greenhouse gas emissions of onshore shale gas in the NT	NT	February 2023
Fact sheet	Understanding the lifecycle of hydraulic fracturing fluids	NT	March 2023
Fact sheet	A review of the beneficial reuse and end use options for brine for the Narrabri Gas Project in northern New South Wales	NSW	March 2023
Fact sheet	Assessing the risk of forest fragmentation from coal seam gas activities for species and ecosystems in the Pilliga Forest, NSW	NSW	March 2023
Fact sheet	Evaluating the medium-term socio economic impacts of onshore gas activity in southern Queensland	QLD	March 2023
Fact sheet	Understanding the integrity of Queensland's coal seam gas wells: Cements, steels and microbial activity	QLD	March 2023
Article	Mitigating and offsetting emissions from proposed onshore gas production in the Northern Territory	NT	March 2023
Presentation	Presentation title 'A successful mixture: Using multiple communication methods across many audiences in a contentious space' at Public Community of Science and Technology 2023 Conference	International	April 2023

COMMUNICATION PRODUCT	NAME OF COMMUNICATION PRODUCT	STATE / TERRITORY	RELEASE DATE
Knowledge transfer presentation	Fate of hydraulic fracturing fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface	NT	April 2023
Knowledge transfer presentation	Putting land management knowledge into practice	NT	April 2023
Final Report	Identification and screening for potential physical hazards to human health from coal seam gas activities at a study site in the Surat Basin, southern Queensland.	QLD	April 2023
Final Report	Health 2 Extension: Chemical interactions with soil and groundwater in the Health 2 study site.	QLD	April 2023
Final Report	Collation of background information and data sources.	QLD	April 2023
Final Report	Identification and screening of air pollutant emissions from CSG activity.	QLD	April 2023
Fact sheet	Screening for potential hazards to human health from CSG activities	QLD	April 2023
Article	New CSIRO research explores influence of coal seam gas activity on human health - CSIRO	QLD	April 2023
Indigenous audio files	GISERA fact sheets turned into audio scripts suitable for translation into Indigenous languages – science audio files in aboriginal languages	NT	May 2023
Final Report	Perspectives on risk to local markets and industries	SA	May 2023
Final Report	Gas Energy in South Australia: A Scenario Exploration	SA	May 2023
Final 2022 Survey Report	Community wellbeing and attitudes to coal seam gas development: Narrabri Shire, NSW 2017 to 2022	NSW	May 2023
Final Report	Developing a wastewater lifecycle management framework for onshore gas development in the Northern Territory	NT	June 2023
Fact sheet	Perspectives on risk to local markets and industries	SA	June 2023
Fact sheet	Developing a wastewater lifecycle management framework for onshore gas development in the Northern Territory	NT	June 2023
Fact sheet	Community wellbeing and attitudes to coal seam gas development in 2022, in Narrabri Shire, NSW	NSW	June 2023
Fact sheet	The role of gas in South Australia	SA	June 2023
Knowledge transfer presentation	Onshore gas water lifecycle management options framework	NT	June 2023
Knowledge transfer presentation	Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo	NT	June 2023

9.3 Stakeholder Engagement

GISERA aims to achieve credibility, trust and respect from all stakeholders through the open and transparent conduct and communication of its research and synthesis activities.

Since launching CSIRO's GISERA in July 2011, the GISERA Director and CSIRO research staff have participated in 1,981 engagements with a range of stakeholders, such as federal and state Members of Parliament, industry associations, community groups, research organisations, gas developers, journalists and consultants.

Table 9.2 outlines the engagements for 2022/23 and Figure 7 shows stakeholder interactions over the past 12 years.

Table 9.2 Summary of GISERA engagements for 2022/23

STAKEHOLDER	NUMBER OF ENGAGEMENTS FOR 2022/23	NUMBER OF ENGAGEMENTS OVER LIFE OF GISERA
Regional community	59	252
Gas Industry	36	387
Federal, State and Local Departments and Agencies	85	617
Media (includes print, TV and radio)	14	243
School/Educational institutions/Students	3	22
Research organisations	21	227
Industry associations	3	133
Business groups	10	100
Total	**231**[26]	**1,981**[27]

[26] It is important to note here that these numbers of interactions do not take into account the number of individuals engaged in that interaction. For example, regional community group interactions can range from 20-360 participants and a gas industry interaction can be a technical meeting with only 1-10 participants

[27] It is important to note here that these numbers of interactions do not take into account the number of individuals engaged in that interaction. For example, regional community group interactions can range from 20-360 participants and a gas industry interaction can be a technical meeting with only 1-10 participants

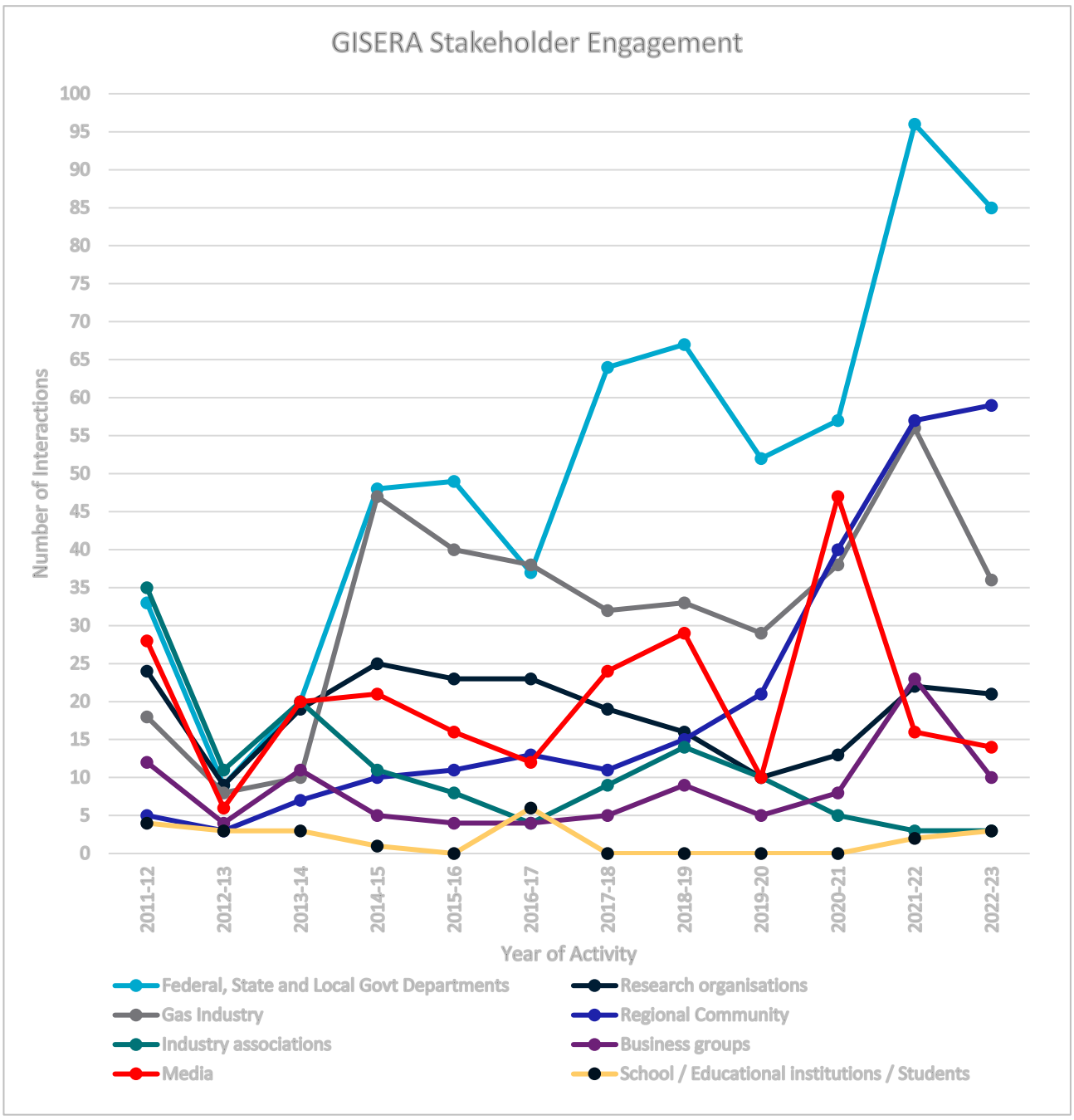

Figure 7 Stakeholder interactions from 2011/12 to 2022/23 - these numbers do not take into account the number of individuals engaged in that interaction. Regional community group interactions can range from 20-360 participants and a gas industry interaction from 1-10 participants.

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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.