Australia's National
Science Agency

**GISERA** | Gas Industry Social and Environmental Research Alliance

# Annual Research and Development Plan and Budget

2021-22

# Contents



**COVER: CSIRO atmospheric monitoring tower at Ironbark, near Tara, Queensland (photo: D. Etheridge)**

# 1 Director's summary

This is the tenth Annual Research & Development Plan and Budget of the CSIRO's Gas Industry Social Environment Research Alliance (GISERA). GISERA's research program has been operational for approximately 10 years.

The 2021-21 financial year progressed the national expansion of CSIRO's GISERA, with a total 4 new projects approved taking the total number of GISERA projects to 70 and total research investment to $32,933,814[1].

A new GISERA Alliance Agreement was executed in June 2021 with existing industry partners Australia Pacific LNG Pty Limited, Origin Energy Upstream Holdings Pty Ltd, Santos Limited and QGC Pty Limited and will run from 1 July 2021 to 30 June 2025.

On 15 September 2020 the Prime Minister announced the government's decision to commit an additional $13.7M towards supporting additional research and communications activities via CSIRO's GISERA. Subsequently, the Department of Industry, Science, Energy and Resources and CSIRO agreed on the terms of a new Commonwealth Grant Agreement which was executed in January 2021 and will run from 19 January 2021 to 30 June 2024.

A Funding Agreement was also established between the Northern Territory's Department of Industry, Tourism and Trade and CSIRO to facilitate the continuation of the GISERA model into the Northern Territory. In the coming months, CSIRO will approach additional industry parties and the State governments to leverage additional funding contributions for GISERA's extension.

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 on key issues regarding policy and legislative frameworks for the gas industry
- improve gas industry operations in regions where exploration and production activities are occurring.

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.

[1] This includes CSIRO in-kind contribution.

# 2 Governance

A key function of CSIRO's GISERA is to undertake research on issues of direct community interest using funding supplied by the Commonwealth and state governments and gas industry. To ensure independence of CSIRO research, a robust governance framework has been created. The framework uses external stakeholder-dominated Research Advisory Committees (RAC) in New South Wales, Queensland, South Australia, Northern Territory and Western Australia to approve projects and allocate research funds.

A new national-interest Research Advisory Committee will also be established to consider national scale projects. It will comprise one Commonwealth Government representative, one Tier 1 Industry representative (drawn from the State or Territory RACs) and at least three Independent representatives (also drawn from the State or Territory RACs).

The RACs are responsible for approving the allocation of research funds to projects which meet the community objectives of addressing issues of concern. The composition and membership of the RACs are critical to the success of GISERA and are dominated by esteemed and respected independent participants from the communities in which gas development is occurring.

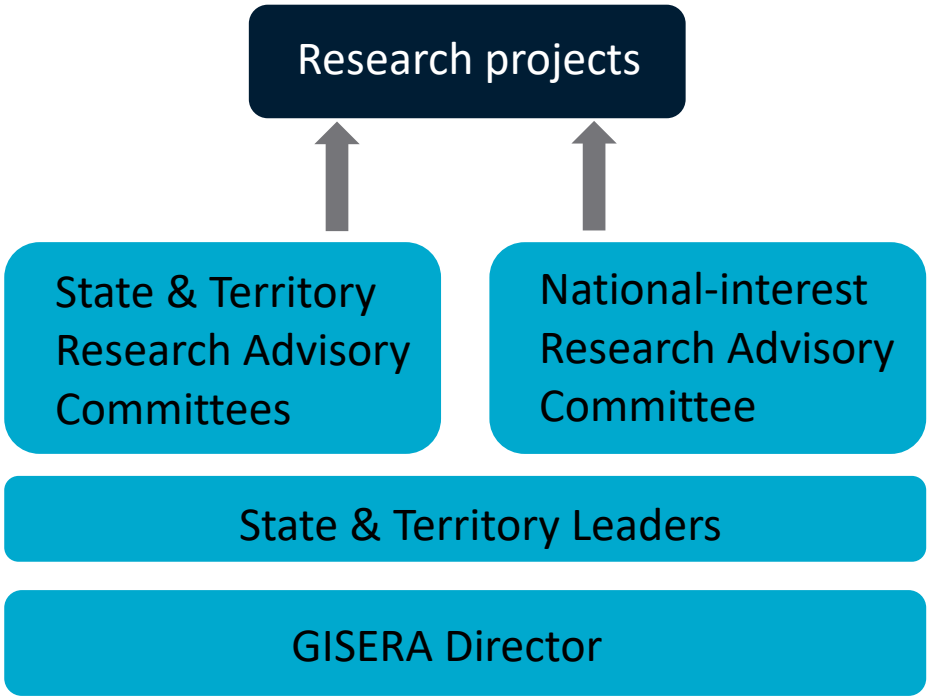


**Figure 1 GISERA governance framework. Research projects and funds are approved by Research Advisory Committees, the majority of which are from local community and non-governmental organisations.**

## Research Advisory Committees' activities

### Northern Territory

The Northern Territory Research Advisory Committee met in March 2021, resulting in:

- Approval of a greenhouse gas footprint project titled 'Methane emissions quantification of well drilling to completion processes in Beetaloo Sub-basin'. This project will 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. This work provides a unique opportunity to gather data about industry operations while they are underway and to accurately determine the level of fugitive methane emissions associated with well construction and completions.
- Approval to proceed with next stage of Putting land management knowledge into practice project.

The Northern Territory Research Advisory Committee met again in June 2021, resulting in:

- Approval of a surface and groundwater project titled 'Fate of hydraulic fracturing fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface'. This project will 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.
- Approval of a project variation including to reduce scope and funding for the greenhouse gas footprint project 'Mitigating Fugitive Gas Emissions from Well Casings'.

One project was completed during this reporting period:

- 'Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT'

Overall, three projects are now complete in the Northern Territory.

### New South Wales

The New South Wales Research Advisory Committee met on in June 2021, resulting in:

- Approval of a socio economic project titled 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 CSG during the pre-construction phase. This will include two surveys at different time points – the first being post-approval and the second to be conducted following a financial investment decision by Santos.
- Approval of a project variation including additional funding for the socio-economic project 'Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase)'.

One project was completed during this reporting period:

- 'Assessing and projecting on-shore gas effects on regional economic activity in NSW'

Overall, 10 projects are now complete in New South Wales.

### Western Australia

The Western Australia Research Advisory Committee met in June 2020, resulting in the following project being approved:

- A surface and groundwater project titled 'Baseline seismic monitoring of the Canning Basin, WA' to 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.

One project was completed during this reporting period:

- 'Baseline assessment of the biodiversity of the Canning Basin, Western Australia'

Overall, 1 project is now complete in Western Australia.

### Queensland

There is one project currently underway in Queensland:

- 'Potential health impacts from CSG'.

Overall, 31 projects are now complete in Queensland.

### South Australia

There are 4 projects currently underway in South Australia.

- 'Perspectives on risk to local markets and industries'
- 'Microbial degradation of chemicals and fluids in aquifers of the Limestone Coast, South Australia'
- 'Decision support framework for future groundwater development scenarios in south east South Australia'
- 'The role of gas in South Australia'

One South Australia project was completed during this reporting period:

- 'Onshore gas and water contamination:  causes, pathways and risks'

Overall, 6 projects are now complete in South 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/.

## Looking ahead

Plans for the 2021-22 year include the development of the next tranche of research projects in Queensland, New South Wales, South Australia, Western Australia and the Northern Territory.

The scale of GISERA research activity in CSIRO continues to increase, with the involvement of over 215 researchers across our Energy, Land & Water, Mineral Resources, Oceans & Atmosphere, Agriculture & Food, Health & Biosecurity, Manufacturing and Data 61 business units over the life of GISERA. We seek to recruit and retain researchers of the highest distinction and potential, and we also explore broader research collaboration opportunities as we continue our planned activities in Queensland, New South Wales, South Australia, Northern Territory and Western Australia.

# 3 National Budget

This is the tenth *GISERA Annual research & development plan and budget* and covers the financial year 2021-22.

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.

## 3.1 National Budget

### 3.1.1 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 3.1.

**Table 3.1 Incoming contributions and grants, by contributor, 2011/12-2020/21**

| 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<br>(Air, water and soil impacts of hydraulic fracturing: Phase 1) | Australia Pacific LNG | **$245,670** |
| | Contribution to project W12<br>(Air, water and soil impacts of hydraulic fracturing: Phase 2) | Australia Pacific LNG | **$1,285,000** |
| | Contribution via APPEA to project GHG 1<br>(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 | **$950,000** |
| | Contribution to project GHG 5<br>(Baseline measurement and monitoring of methane emissions in the Beetaloo Sub-basin) | NT Government | **$305,297** |
| | In-kind contribution to project W25<br>(Baseline seismic monitoring of the Canning Basin) | Geological Survey of WA (GSWA) | **$1,154,800** |
| | In-kind contribution to project W25<br>(Baseline seismic monitoring of the Canning Basin) | Geoscience Australia (GA) | **$300,000** |
| CSIRO | In-kind | CSIRO | **$11,888,946** |
| Other | In-kind contribution to project L5<br>(Without a Trace) | University of Southern Queensland (USQ) | **$79,990** |
| | In-kind contribution to project W18<br>(Characterisation of the Stygofauna and microbial assemblages of the Beetaloo Sub-basin) | Charles Darwin University (CDU) | **$53,858** |
| **TOTAL** | | | **$54,909,768** |

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

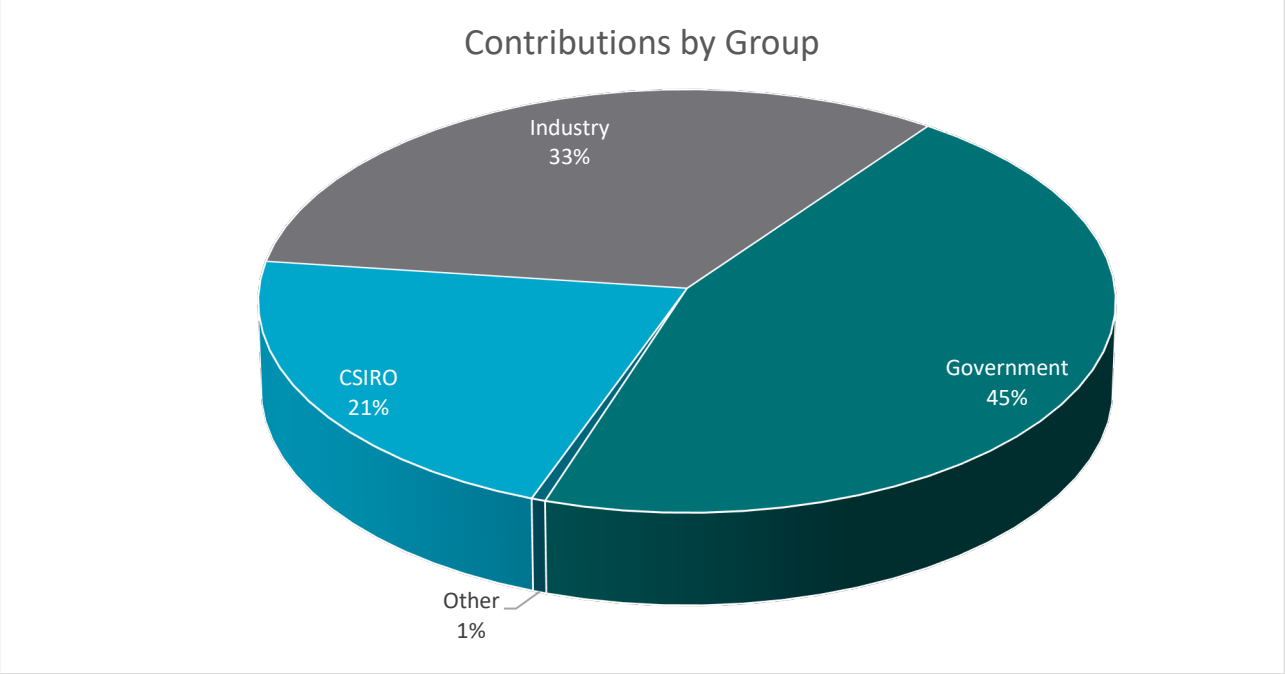


**Figure 2 Committed contribution over life of GISERA, by group**

### 3.1.2 Committed Research Investment

The committed budget for projects across all regions for 2011/12-2026/27 now stands at $32,933,814. A breakdown of the committed research budget for the various research subject areas is illustrated in Table 3.2. Figure 2 shows the portion committed to each research subject area and Figure 3 show the portion committed to each region.

**Table 3.2 Committed research investment across all regions, by research subject area, 2011/12-2026/27**

| RESEARCH SUBJECT AREA | TOTAL RESEARCH INVESTMENT |
|---|---|
| Surface and groundwater | **$14,858,074** |
| Greenhouse gas footprint | **$4,572,054** |
| Agricultural land management | **$3,492,979** |
| Terrestrial Biodiversity | **$2,669,302** |
| Marine environment | **$1,693,199** |
| Social and economic | **$4,352,790**[3] |
| Health | **$1,295,416** |
| **Total** | **$32,933,814**[4] |

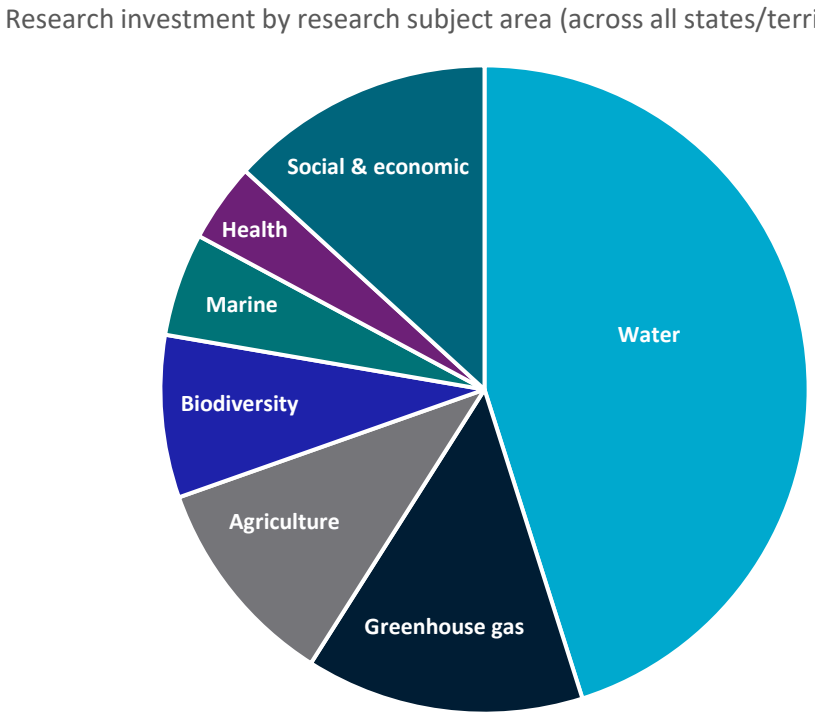


**Figure 3 Committed research investment across all states/territories, by research subject area, 2011/12-2026/27**

[3] 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.

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

Table 3.3 Committed research investment across by state/territory, 2011/12-2026/27

| STATE / TERRITORY | TOTAL RESEARCH INVESTMENT |
|---|---|
| Queensland | **$19,563,629** |
| Northern Territory | **$5,046,862** |
| New South Wales | **$3,344,588** |
| South Australia | **$2,677,858** |
| Western Australia | **$2,300,877** |
| **Total** | **$32,933,814** |

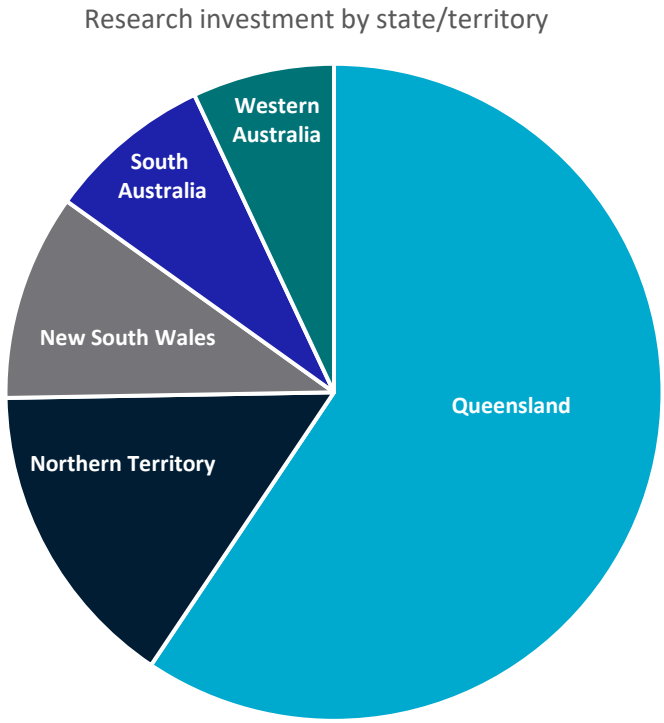


Figure 4 Committed research investment, by state/territory 2011/12-2026/27

## 3.2 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 Number of research projects in each region**

**Table 3.4 Research project titles in each state/territory**

| RESEARCH AREA | QLD | NSW | SA | NT | WA |
|---|---|---|---|---|---|
| Surface and Groundwater | • Geochemical responses to re-injection<br>• Re-injection of CSG water<br>• Isotope and geochemical groundwater baseline study<br>• High performance groundwater modelling<br>• Hydrocarbons in groundwater, Surat and Bowen basins<br>• Improving groundwater flow models<br>• Groundwater contamination risk assessment on hydraulic fracturing in unconventional gas extraction*<br>• Air, water and soil impact of hydraulic fracturing: Phase 1<br>• Air, water and soil impact of hydraulic fracturing: Phase 2 | • Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux<br>• Spatial design of groundwater monitoring network in the Narrabri Gas Project area<br>• Improving the representation of the impact of coal seam gas extraction in groundwater flow models for the Namoi region<br>• Groundwater contamination risk assessment on hydraulic fracturing in unconventional gas extraction*<br>• Assessment of faults as potential connectivity pathways | • Onshore gas and water contamination: causes, pathways and risks<br>• Groundwater balance in gas development regions of south-east SA<br>• Microbial degradation of onshore gas- related chemical compounds<br>• Microbial degradation of chemicals and fluids in aquifers of the Limestone Coast, SA<br>• Decision support framework for future groundwater development scenarios in the southeast SA | • Baseline assessment of groundwater characteristics in the Beetaloo sub-Basin, NT<br>• Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids<br>• Characterisation of the stygofauna and microbial assemblages of the Beetaloo sub-Basin, NT<br>• Improved approaches to long-term monitoring of decommissioned onshore gas wells<br>• Onshore gas water lifecycle management options framework<br>• Fate of hydraulic fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface | • Groundwater baseline study of the Canning Basin<br>• Baseline seismic monitoring of the Canning Basin |
| Social and economic | • Monitoring regional transition<br>• Understanding community aspirations<br>• Economic assessment and forecasting project<br>• Community functioning and well-being<br>• Community function and well-being survey 2<br>• Trends in community wellbeing and attitudes to CSG development, Survey 3 | • Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations<br>• Social baseline assessment of the Narrabri region of NSW in relation to CSG development<br>• Decommissioning pathways for CSG projects<br>• Assessing and projecting on-shore gas effects on regional economic activity<br>• Monitoring community wellbeing and attitudes to CSG in Narrabri (pre-construction phase) | • Community well-being and attitudes to conventional gas<br>• Assessing the value of locally produced conventional gas in SA's South East<br>• The Role of Gas in South Australia | • Mapping future transport passages and volumes for improved planning and operation | |

| RESEARCH AREA | QLD | NSW | SA | NT | WA |
|---|---|---|---|---|---|
| | | Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase) | | | |
| Greenhouse gas and air quality | • Methane seepage in the Surat Basin<br>• Ambient air quality in the Surat Basin<br>• Greenhouse gas 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<br>• Mitigating Fugitive Gas Emissions from Well Casings<br>• Offsets for Life cycle Greenhouse Gas Emissions of Onshore gas in the NT<br>• Methane emissions quantification of well drilling to completion processes in Beetaloo Sub-basin | |
| Terrestrial Biodiversity | • Priority threat identification, management and appraisal<br>• Fire ecology of grassy woodlands<br>• Habitat selection by two focal species<br>• Ensuring biodiversity offset success: the right kind of seed for a rare daisy<br>• Guidelines for offset population sizes | | | • Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo | • Baseline assessment of the biodiversity of the Canning Basin |
| Agricultural land management | • Preserving agricultural productivity<br>• Shared space<br>• Gas farm design<br>• Making tracks, treading carefully<br>• Without a trace<br>• Telling the story<br>• CSG and Livestock - Inside the heard | | • Gas impacts and opportunities on primary industries<br>• Perspectives on risk to local markets and industries | • Putting land management knowledge into practice | |
| Health impact | • Potential human health impacts from CSG activities | • Human health effects of CSG activity: Review and study design | | | |
| Marine Environment | • Sustaining turtles and their homes | | | | |

**This is a jointly funded QLD and NSW project.*

# 4 Queensland R&D Plan & Budget

## 4.1 Queensland Investment profile

### 4.1.1 Committed research investment for 2011/12-2021/22

The committed budget for projects in Queensland for 2011/12-2021/22 now stands at $19,563,629. A breakdown of the committed research budget across the various research subject areas is illustrated in Table 4.1 and Table 4.2 shows the investment committed by contributor.

**Table 4.1 Committed research investment in Queensland by research subject area, 2011/12-2021/22**

| TOPIC | TOTAL RESEARCH INVESTMENT |
|---|---|
| Water (36%) | **$7,086,720** |
| Greenhouse gas (14%) | **$2,799,415** |
| Agriculture (14%) | **$2,809,166** |
| Biodiversity (12%) | **$2,298,558** |
| Marine (9%) | **$1,693,199** |
| Social & economic (10%) | **$1,853,679** |
| Health (5%) | **$1,022,892** |
| **Total** | **$19,563,629** |

**Table 4.2 Committed research investment in Queensland by contributor, 2011/12-2021/22**

| CONTRIBUTOR | CONTRIBUTION TYPE | TOTAL RESEARCH CONTRIBUTION |
|---|---|---|
| CSIRO (29.5%) | In-kind | **$5,773,176** |
| USQ (0.4%) | In-kind contribution to project L5 (Without a Trace) | **$79,990** |
| Australia Pacific LNG (54.9%) | GISERA Membership | **$8,918,952** |
| | Contribution via APPEA to project GHG 1 (Methane Seepage in the 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 (8.2%) | GISERA Membership | **$1,332,267** |
| | Contribution via APPEA to project GHG 1 (Methane Seepage in the Surat Basin) | **$280,427** |
| Santos (1.4%) | Contribution via APPEA to project GHG 1 (Methane Seepage in the Surat Basin) | **$280,427** |
| Arrow Energy (1.4%) | Contribution via APPEA to project GHG 1 (Methane Seepage in the Surat Basin) | **$280,427** |
| Federal Government (1.6%) | Grant | **$306,867** |
| Qld Government (2.6%) | Grant | **$500,000** |
| **Total** | | **$19,563,629** |

### 4.1.2 Queensland Current Research Portfolio

A summary of all approved research projects in Queensland is provided in table 4.3

**Table 4.3 Approved Queensland Research Projects**

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | 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. | Methods for predicting water quality changes resulting from CSG water re-injection. | Completed |
| | Re-injection of CSG water - understand, quantify, and manage clogging of injection wells during re-injection of CSG water permeates, brines and blends. | Strategies to manage clogging of re-injection wells to maximise re-injection volumes. | Completed |
| | High performance groundwater modelling - determine the feasibility of large-scale re-injection schemes. | Models that assess the feasibility of large re-injection schemes and predict how re-injection may reduce impacts from CSG development. | 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. | Baseline measures of groundwater quality and protocols for monitoring changes in groundwater quality, during and after development. | 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. | Information and methods to assess possible sources of hydrocarbons in groundwater to help differentiate naturally occurring hydrocarbons and those potentially introduced during gas extraction process. | 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. | New data and modelling approach to assess flow rates and volumes of usable groundwater resources in CSG regions in Queensland. | Completed |
| | Groundwater contamination risk assessment - assess the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage. | Quantitative estimate of the risk of groundwater contamination at a basin/sub-basin scale. This will help management plans and strategies to reduce the risk of surface and groundwater contamination and provide communities a better understanding of potential impacts to local water resources. | 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. | A report summarising the current state of knowledge regarding sources of air, water and soil pollutants associated with CSG extraction using hydraulic fracturing, a peer-reviewed design for a measurement program that will provide enhanced information of the impacts of hydraulic fracturing and a report presenting an analysis of air, water and soil quality before commencement of hydraulic fracturing activity. | 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. | A series of reports summarising the impacts of hydraulic fracturing on of air, water and soil quality, based on data from a comprehensive measurement program air, water and soil quality before, during and after hydraulic fracturing activity. | Completed |

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | STATUS |
|---|---|---|---|
| **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. | Identify ways to help local communities in responding to resource development to maximise social benefit. | 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. | Inform strategic investments that will help maintain or enhance community function and well-being. | Completed |
| | Economic assessment and forecasting project - understand future impacts on regional economies and how local businesses can respond. | Forecasts calculating likely economic effects during the operations phase and lessons to support local businesses. | 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. | Help inform sound industry and policy activities to satisfy the social licence to operate. | 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. | Identify strategies that can be enacted by local and state government to proactively reduce stresses associated with rapid change and to take advantage of opportunities arising from resource development. | 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. | The project will inform the community, industry and government understanding of how and why community wellbeing and attitudes to CSG vary between regions and phases of CSG activity for planning and approval purposes. A more comprehensive understanding of these dynamics across time and space will enable more strategic and proactive policy and planning around CSG development. | Completed |
| **Marine environment** | Sustaining turtles and their homes - understand how sediments from dredging and discharges affect seagrass and turtles. | Quantifying the risks to turtle populations from dredging and increased boat traffic. | Completed |
| **Greenhouse gas footprint** | 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. | A methane emissions data set that can be used to compare changes in methane concentrations as coal seam gas production in the Surat Basin increases. | 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. | Assessments of benefits and risks related to the extraction, transport and usage of gas in terms of their GHG emission footprint. | 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. | Identify the impact of CSG production activities on air quality in the Surat region. | Completed |
| **Agricultural land management** | Preserving agricultural productivity - assist in the preservation of agricultural productivity during land use change. | Developing methods for most equitably and/ or cost-effectively preserving agricultural productivity. | Completed |
| | Shared space - understand how farmers from a range of production systems (extensive grazing to | Information that assists farmers and developers to negotiate means of co- | Completed |

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | STATUS |
|---|---|---|---|
| | intensive cropping) perceive and value CSG developments on their and others' farms. | existence that maximise benefits and minimise social and economic costs. | |
| | Gas farm design - understand how to design farms for a new mixed land use. | Design principles and practices that optimise farm and gas infrastructure and operations, minimising negative impacts and maximising benefits. | Completed |
| | Making tracks, treading carefully - understand the direct and indirect impacts of tracks and traffic on invasive species and erosion in agricultural landscapes. | Guidelines for quantifying, monitoring and managing weed and erosion threats. | Completed |
| | Without a trace - identify the nature and likely extent of damage to agricultural soils, and methods for avoiding and improving soils. | Methods for installing and operating gas infrastructure that avoids soil damage, and novel methods for rehabilitating damage that does occur. | Completed |
| | Telling the story - Share understanding of changes on farms and in towns during CSG development in the Surat area. | Development of a detailed landscape map showing changes during CSG developments & face-to-face engagements at local shows or community events in the Surat region. | 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. | A detailed study of livestock behaviour, pastures, soil processes, and dust deposition for a real CSG property. | Completed |
| **Terrestrial 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. | Determine which conservation management activities will best mitigate the risks to biodiversity. | Completed |
| | Fire ecology of grassy woodlands - determine the sensitivity of region's flora and fauna to changed fire regimes, and the thresholds at which changed fire regimes cause substantial ecological impact. | Advice on how to best manage the biodiversity impacts of altered fire regimes associated with CSG development. | 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. | Management options for the Golden-tailed gecko and Glossy black-cockatoo habitats to ensure their long-term endurance. | 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. | Best practice guidelines for moving the *Rutidosis lantana*, a rare daisy, to a new location. Guidelines will help to minimise biological limits to reproductive success and maximise population viability of the daisy. | Completed |
| | 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. | Evidence-based guidelines for the size of plant populations needed to maximise establishment and persistence of rare plant species. | 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. | 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. | Near completion |

### 4.1.3 Queensland Research Progress and Expenditure

The committed Queensland 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 Queensland, by project**

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[5] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| **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[6] | $293,542 | 101% | 100% |
| | Air, water and soil impacts of hydraulic fracturing (Phase 1)* | $330,795[7] | $351,433 | 106% | 100% |
| | Air, water and soil impacts of hydraulic fracturing (Phase 2)* | $2,111,055[8] | $2,153,095 | 102% | 100% |
| **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% |
| | Trends in community wellbeing and attitudes to CSG development - survey 3* | $240,474 | $243,795 | 101% | 100% |
| **Marine environment** | Sustaining turtles and their homes* | $1,693,199 | $1,802,905 | 106% | 100% |
| **Greenhouse gas footprint** | Methane seepage in the Surat Basin* | $2,015,937[9] | $2,293,692 | 114% | 100% |

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

[6] 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.

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

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

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

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[5] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| | 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% |
| **Agricultural land management** | 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[10] | $339,990 | 100% | 100% |
| | Telling the story* | $332,224 | $329,234 | 99% | 100% |
| | CSG and Livestock- Inside the herd* | $233,333 | $239,628 | 103% | 100% |
| **Terrestrial biodiversity** | Priority threat identification, management and appraisal* | $945,400 | $995,144 | 105% | 100% |
| | Fire ecology of grassy woodlands* | $789,042 | $840,016 | 106% | 100% |
| | 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% |
| **Health** | Potential health impacts from CSG | $1,022,892 | $996,253 | 97% | 83% |
| **TOTAL ALLOCATED BUDGET** | | **$19,563,629** | | | |

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

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

## 4.2 Queensland research ideas being discussed for 2021/22

Approximately $2,798,835[11] cash remains available for new project proposals to be initiated in FY 2021/22.

The following projects ideas 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 Queensland for 2021/22**

| RESEARCH AREA | IDEA | POTENTIAL STATE/TERRITORY | ESTIMATED COST |
|---|---|---|---|
| Greenhouse Gas | A systematic understanding of greenhouse gas emissions potential from coal seam gas holding ponds in Queensland | QLD | $350-400K |
| Health Impacts | Potential human health effects of six identified chemical factors in the southern Surat Basin, Queensland | QLD Surat | $400K |
| Water | Understanding potential impact of surface infrastructure on flood water flow in the Cooper Basin. This project will use the flood model developed for the Cooper region by the GBA program to assess the impact of surface infrastructure on flood water flow. This will allow different strategies to be assessed for their impact utilising a highly sophisticated model. | QLD Cooper | $600K |

[11] This figure is total GISERA funding for Queensland, less $19,563,629 already committed to research (tables 4.1 and 4.2) and less anticipated costs for the Director's Office/Communication for the life of GISERA. The remaining research budget does not include any future State Government contributions or CSIRO in-kind contributions.

# 5 NSW R&D Plan & Budget

## 5.1 NSW Investment profile

### 5.1.1 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 $3,344,589. A breakdown of the committed research budget across the various research subject areas is illustrated in Table 5.1 and Table 5.2 shows the investment committed by contributor.

**Table 5.1 Committed research investment in NSW by research subject area, 2016/17-2026/27**

| RESEARCH AREA | TOTAL RESEARCH INVESTMENT |
|---|---|
| Water (41%) | **$1,371,209** |
| Greenhouse gas (5%) | **$155,363** |
| Social & economic (46%) | **$1,545,493** |
| Health (8%) | **$272,524** |
| **TOTAL** | **$3,344,589** |

**Table 5.2 Committed research investment in NSW by contributor, 2016/17-2026/27**

| CONTRIBUTOR | CONTRIBUTION TYPE | TOTAL RESEARCH CONTRIBUTION |
|---|---|---|
| CSIRO (24%) | In-kind | **$787,394** |
| Santos (8%) | GISERA Membership | **$280,608** |
| AGL (7%) | GISERA Membership | **$221,137** |
| Federal Government (49%) | Grant | **$1,643,210** |
| NSW Government (12%) | Grant | **$412,240** |
| **TOTAL** | | **$3,344,589** |

### 5.1.2 NSW Current Research Portfolio

A summary of all approved research projects in NSW is provided in table 5.3

**Table 5.3 Approved NSW Research Projects**

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | 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. | 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. | 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. | Optimal spatial design of groundwater monitoring networks to improve confidence around predicted groundwater impacts and help minimise the risk of environmental damage. | 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. | 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. | Completed |
| | Groundwater contamination risk assessment - Assess the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage. | Quantitative estimate of the risk of groundwater contamination at a basin/sub-basin scale. This will help inform management plans and strategies to reduce the risk of surface and groundwater contamination and provide communities a better understanding of potential impacts to local water resources. | 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. | Using a combination of different geophysical methods and environmental tracers this study will assess the continuity and performance of aquitards separating shallow aquifers and coal seams within and near the proposed gas project development area south-west of Narrabri. | Near completion |
| **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. | Comprehensive baseline assessment of economic, social and demographic characteristics of CSG regions in NSW and the potential impacts of CSG on these characteristics. | 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. | Baseline information about the community's wellbeing, perceptions, expectations and resilience in relation to CSG development. | Completed |
| | Decommissioning pathways for CSG projects - Review regulatory frameworks in relation to principles derived from international literature and consider social concerns regarding | Recommendations for an integrated approach to improving the social, economic and environmental effectiveness of decommissioning of wells and well pads. | Completed |

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | STATUS |
|---|---|---|---|
| | decommissioning of wells and well pad infrastructure. | | |
| | 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 | An improved understanding of the role of the gas industry in NSW across a comprehensive set of economic and social indicators, enabling insights into potential changes to NSW industry, employment, land use, productivity, and human capital under a range of gas industry development scenarios. | 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. | This research fills a gap between the pre-approval baseline assessment survey that was conducted by CSIRO's GISERA in 2017 and a planned future survey to be conducted during the construction phase, should the project proceed.<br>Results of this research contribute towards a comprehensive longitudinal study over the next five years around community wellbeing and local attitudes towards CSG in Narrabri. | To commence in 21/22 |
| | Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase)[12] - 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. | This research will follow on from the pre-approval baseline assessment survey that was conducted in 2017 and the pre-construction phase survey that will be conducted in 2022. | To commence in 24/25 |
| **Greenhouse gas footprint** | 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. | This research will result in a detailed inventory and map of methane emissions for the Pilliga region that can be used to compare emissions once large-scale gas extraction starts. | 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. | Comprehensive study design to investigate effects of CSG activity on human health, including development of a conceptual model to inform the study design. | Completed |

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

### 5.1.3 NSW Research Progress and Expenditure

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

**Table 5.4 Committed research investment, expenditure and progress in NSW, by project**

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[13] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| Surface and groundwater | Impacts of CSG depressurisation on the Great Artesian Basin flux* | $429,859 | 429859 | 100% | 100% |
| | Data- worth analysis and spatial design of groundwater monitoring networks in the Narrabri Gas Project area* | $216,218 | $217,613 | 101% | 100% |
| | Improving groundwater models to better represent coal seam gas extraction impacts in the Namoi region* | $301,295 | $301,834 | 100% | 100% |
| | Water contamination risk assessment on hydraulic fracturing in unconventional gas extraction* | $290,624[14] | $293,542 | 101% | 100% |
| | Assessment of faults as potential connectivity pathways | $234,930 | $142,508 | 61% | 60% |
| 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% |
| | 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) | $322,360 | $0 | 0% | 0% |
| | Monitoring community wellbeing and attitudes to CSG in Narrabri (construction phase) | $289,388[15] | $0 | 0% | 0% |
| Greenhouse gas footprint | Regional methane emissions in NSW CSG basins* | $155,363 | $155,363 | 100% | 100% |
| Health | Human Health effects pf Coal Seam Gas Activity Study Design* | $272,524 | $317,002 | 116% | 100% |
| **TOTAL ALLOCATED BUDGET** | | **$3,344,589** | | | |

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

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

[15] 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.

## 5.2 NSW research ideas being discussed for 2021/22

Approximately $1,624,295[16] cash remains available for new project proposals to be initiated in FY 2021/22.

The following projects ideas 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 NSW for 2021/22**

| RESEARCH AREA | IDEA | POTENTIAL STATE/TERRITORY | ESTIMATED COST |
|---|---|---|---|
| Asset decommissioning | A unique opportunity exists to study the legacy of a CSG development at final stages of decommissioning in Camden. | NSW | $250-400K |
| Biodiversity | Optimal biodiversity management strategies for plant population offsetting | NSW | $200-350K |
| Surface and Groundwater | Risk based study on alternative uses of treated water | NSW | $250-350K |

[16] This figure is total GISERA funding for NSW, less $3,344,589 already committed to research (tables 5.1 and 5.2) and less anticipated costs for the Director's office/Communications for the life of GISERA. The remaining research budget does not include future State Government contributions or CSIRO in-kind contributions.

# 6 South Australia R&D Plan & Budget

## 6.1 South Australia Investment profile

### 6.1.1 Committed research investment for 2018/19 - 2022/23

The committed budget for projects in South Australia for 2018/19-2022/23 now stands at $2,677,858. A breakdown of the committed research budget across the various research subject areas is illustrated in Table 6.1 and Table 6.2 shows the investment committed by contributor.

**Table 6.1 Committed research investment in South Australia by research subject area, 2018/19-2022/23**

| RESEARCH AREA | TOTAL RESEARCH INESTMENT |
|---|---|
| Water (55%) | **$1,484,564** |
| Agriculture (16%) | **$433,984** |
| Social & economic (29%) | **$759,310** |
| **Total** | **$2,677,858** |

**Table 6.2 Committed research investment in South Australia by contributor, 2018/19-2022/23**

| CONTRIBUTOR | CONTRIBUTION TYPE | TOTAL RESEARCH CONTRIBUTION |
|---|---|---|
| CSIRO (25%) | In-kind | **$669,465** |
| Federal Government (46%) | Grant | **$1,225,787** |
| SA Government (29%) | Grant | **$782,606** |
| **Total** | | **$2,677,858** |

### 6.1.2 South Australia Current Research Portfolio

A summary of all approved research projects in South Australia is provided in table 6.3.

**Table 6.3 Approved South Australia Research Projects**

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | 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. | Achieve a realistic quantification of groundwater contamination risks in gas development areas of southeast SA. | Underway |
| | 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. | An improved understanding of groundwater flow regimes in selected gas development areas of the Otway Basin will help inform decision making and community understanding of water takes by the gas industry in relation to other water uses and management measures required for optimal water use. | 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. | Provide 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. | 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. | This project will establish microbial community baselines in the TLA in the Limestone Coast region. The project will also examine microbial degradation of a range of chemicals likely to be used in onshore gas activities, in aquifer water samples. | Underway |
| | 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. | Increasing demands on available water resources and the requirement for sustainable development have implications for the amount of water available for agricultural and industrial uses in the future. A science-based decision support framework will assist policy development and decision-makers to manage valuable water resources. | Underway |
| 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. | Baseline information about community well-being, perceptions, expectations and resilience for conventional gas development, to improve awareness and knowledge. | 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. | 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. | Completed |
| | The role of gas in South Australia - clarify the role of natural gas in meeting the state's renewable | Research outcomes will help define a least cost technical pathway towards 100 per cent renewable electricity and a hydrogen industry | Underway |

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | STATUS |
|---|---|---|---|
| | energy, security, emissions and energy pricing goals. | which supports an eventual zero net emissions in South Australia, consistent with South Australia's Climate Change Strategy 2015-2050 – Towards a Low Carbon Economy. | |
| Agricultural land management | Gas impacts and opportunities on primary industries - analyse possible impacts and opportunities from gas development for rural areas in South Australia's south east. | Information to assist community understanding and inform policy development of potential impacts and opportunities from conventional gas development on primary industries. | 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 South Australia. | Results from this research will assist community understanding and inform public communications and policy development. | Underway |

### 6.1.3 South Australia Research Progress and Expenditure

The committed South Australia research budget, expenditure and milestones completed for each project is provided in table 6.4. (* = completed projects).

**Table 6.4 Committed research investment, expenditure and progress in South Australia, by project**

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[17] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| 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 | $327,997 | 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 | $242,216 | 89% | 43% |
| | Decision support framework for future groundwater development scenarios in the southeast South Australia | $366,872 | $106,108 | 29% | 29% |
| Social and Economic | Community wellbeing and attitudes to conventional gas development in the south east of South Australia* | $198,500 | $197,830 | 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 | $37,171 | 12% | 0% |
| Agricultural land management | Gas impacts and opportunities on primary industries* | $175,133 | $178,089 | 102% | 100% |
| | Perspectives on risk to local markets and industries | $258,851 | $101,238 | 39% | 40% |
| **TOTAL ALLOCATED BUDGET** | | **$2,677,858** | | | |

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

## 6.2 South Australia research ideas being discussed for 2021/22

Approximately $1,000,000[18] cash remains available for new project proposals to be initiated in FY 2021/22.

The following projects ideas 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 South Australia for 2021/22**

| SUBJECT AREA | IDEA | POTENTIAL STATE/TERRITORY | ESTIMATED COST |
|---|---|---|---|
| **Land** | Increased seismic activity associated with subsurface activities is an increasing area of community concern. Building on experience in other locations a baseline study will distinguish any potential increase in seismic activity due to new exploration and operational activity in the western side of the Otway Basin using passive seismic arrays and near real time reporting of location and magnitudes of events. Types of monitoring equipment will be evaluated and compared with some of the existing GA national network. | SA Otway | $400-500K |

[18] This figure is total GISERA funding for South Australia less $2,677,858 already committed to research (tables 6.1 and 6.2) and less anticipated costs for the Director's office/Communications for the life of GISERA. The remaining research budget does not include future state government contributions or CSIRO in-kind contributions.

# 7 Northern Territory R&D Plan & Budget

## 7.1 Northern Territory Investment profile

### 7.1.1 Committed research investment for 2018/19 - 2022/23

The committed budget for projects in Northern Territory for 2018/19-2022/23 now stands at $5,046,861. A breakdown of the committed research budget across the various research subject areas is illustrated in Table 7.1 and Table 7.2 shows the investment committed by contributor.

**Table 7.1 Committed research investment in Northern Territory by research subject area, 2018/19-2022/23**

| RESEARCH AREA | TOTAL RESEARCH INVESTMENT |
|---|---|
| Water (53%) | **$2,665,928** |
| Greenhouse Gas Footprint (32%) | **$1,617,276** |
| Agriculture (5%) | **$249,829** |
| Social & economic (4%) | **$194,308** |
| Biodiversity (6%) | **$319,520** |
| **Total** | **$5,046,861** |

**Table 7.2 Committed research investment in Northern Territory by contributor, 2018/19-2022/23**

| CONTRIBUTOR | CONTRIBUTION TYPE | TOTAL RESEARCH CONTRIBUTION |
|---|---|---|
| CSIRO (22%) | In-kind | **$1,096,421** |
| Origin (6%) | GISERA membership | **$302,546** |
| Santos (7%) | GISERA membership | **$355,830** |
| Pangaea (3%) | GISERA membership | **$123,438** |
| Federal Government (48%) | Grant | **$2,445,034** |
| NT Government (13%) | Grant | **$669,734** |
| 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** | | **$5,046,861** |

### 7.1.2 Northern Territory Current Research Portfolio

A summary of all approved research projects in Northern Territory is provided in table 7.3

**Table 7.3 Approved Northern Territory Research Projects**

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | 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. | Sample and analyse groundwater in the Beetaloo Sub-basin, and create a set of baseline data against which any potential impacts caused by the gas industry can be measured. It will provide information about the baseline geochemistry and groundwater flow characteristics in the Cambrian Limestone Aquifer. | Completed |
| | 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. | Provide new knowledge concerning stygofauna and subterranean groundwater dependent ecosystems in the Beetaloo Sub-basin and Roper River system, a critical knowledge gap identified by the Final Report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory (2018). | 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. | Baseline information about microbial communities in aquifers and soils, and understanding how microbes influence degradation of chemicals typically used in the onshore gas industry in soils and aquifers in the Northern Territory. This information can also be used to gauge the health of groundwater ecosystems. | Near completion |
| | 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 | Knowledge developed through this project will assist in the development of long-term well monitoring techniques and technologies to support best practice in onshore gas well decommissioning activities in the Northern Territory. | Near completion |
| | 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. | This framework will provide a high level of environmental protection for community and government while remaining cost-effective for industry. | Underway |
| | 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. | This project will improve understanding of the degradation and transport of these chemicals within the subsurface. In addition, this study will examine flow-back water and provide insights into the biodegradation of these chemicals and naturally occurring (geogenic) hydrocarbons in flow-back water as well as in holding tanks and ponds in industry facilities. | To commence in 21/22 |
| Greenhouse Gas Footprint | 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. | Monitor and measure background methane levels and rate of change in methane levels during the dry, wet, and fire seasons using mobile survey technology. | Completed |
| | Mitigating Fugitive Gas Emissions from Well Casings - review current industry practice and conduct experimental investigations to evaluate techniques | Results of this project will help reduce fugitive methane emissions by improving the integrity of gas wells through the development effective materials | Completed |

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | STATUS |
|---|---|---|---|
| | and assess new materials designed to minimise fugitive methane emissions leaking from microfractures and gaps in gas well cement casing | and best practice techniques for sealing microfractures and micro-annuli in well casing cement. | |
| | 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 Northern Territory's Beetaloo Sub-basin. | Currently, there is no natural gas production in the Beetaloo Sub-basin. This project will use scenario analysis to represent potential gas extraction, coupled with technical calculations on the GHG emissions implications of those scenarios.<br><br>An important aspect of developing natural gas is the estimation of fugitive methane emissions from production scenarios. CSIRO has been actively conducting research on methane emissions for more than 30 years across a range of industries, including the coal seam gas industry in Queensland. | Underway |
| | 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 |
| Agricultural land management | 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. Part of this work will include development of novel communication tools to improve exchange of data between groups. | This research will use modern data visualization techniques to present spatial data relating to landscape processes in the Beetaloo Sub-basin in a "virtual landscape" using augmented reality technology. This allows complex processes such as hydrology, soil loss or pasture dynamics to be more easily understood, and to communicate best practice management of potential environmental risk. | Underway |
| Terrestrial 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. | New scientific information about potential biodiversity impacts will help identify areas that are most threatened by infrastructure development and assist management approaches and decision-making to reduce risk to biodiversity while facilitating development. | Underway |
| Social and Economic | Mapping future transport passages and volumes for improved planning and operation - Using scenarios of both construction and operational phases of gas 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 Northern Territory. It will also test a range of interventions that may increase road safety while reducing costs and impacts on the environment and local communities. | Results of this research will support decision-making across industry, government regulation and community. The analysis will consider freight task increase from the current baseline, transport costs, emissions, road maintenance, impacts of dust on agriculture and human health, and related effects on local business activities. It will include existing traffic across the road and rail network as well as introduced traffic (heavy and domestic vehicles). | Near completion |

### 7.1.3 Northern Territory Research Progress and Expenditure

The committed Northern Territory research budget, expenditure and milestones completed for each project is provided in table 7.4 (* = completed projects).

**Table 7.4 Committed research investment, expenditure and progress in Northern Territory, by project**

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[19] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| 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[20] | $346,909 | 100% | 100% |
| | Improved approaches to long-term monitoring of decommissioned onshore gas wells | $352,436 | $252,010 | 72% | 67% |
| | Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids | $291,964 | $291,457 | 100% | 83% |
| | Onshore gas water lifecycle management options framework | $409,833 | $156,648 | 38% | 43% |
| | Fate of hydraulic fluids/chemicals and geogenic hydrocarbons in surface facilities and in the subsurface | $854,255 | $0[21] | 0% | 0% |
| Greenhouse Gas Footprint | 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 | $263,455 | 63% | 57% |
| | Methane emissions quantification of well drilling to completion processes in Beetaloo Sub-basin | $655,846 | $159,678 | 24% | 0% |
| Agricultural land management | Putting land management knowledge into practice | $249,829 | $153,795 | 62% | 50% |
| Terrestrial biodiversity | Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo | $319,520 | $4,232 | 1% | 0% |
| Social and Economic | Mapping future transport passages and volumes for improved planning and operation | $194,308 | $138,266 | 71% | 60% |
| **TOTAL ALLOCATED BUDGET** | | **$5,046,861** | | | |

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

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

[21] This is a newly approved project. Expenditure will be incurred in 2021/22.

## 7.2 Northern Territory research ideas being discussed for 2021/22

Approximately $3,412,408[22] cash remains available for new project proposals to be initiated in FY 2021/22.

The following projects ideas 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 Northern Territory for 2021/22**

| SUBJECT AREA | IDEA | POTENTIAL STATE/TERRITORY | ESTIMATED COST |
|---|---|---|---|
| **Water** | An integrated project to understand surface water features of the Beetaloo region, their environmental and cultural significance, and potential for interaction with unconventional gas activities. | NT Beetaloo | $1.2M |
| **Land** | An investigation of induced seismicity risk and its mitigation in the Beetaloo Basin in the Northern Territory. The NT Hydraulic Fracturing Inquiry surmised that the induced seismicity risk in the Northern Territory is low. However, they also recommended that a monitoring and response system be implemented to further minimise any induced risks.<br>The overall objective of this research is to provide the evidence base for the requirements for monitoring and response systems for induced system in the Beetaloo Basin. | NT Beetaloo | $400K |
| **Biodiversity** | Surface habitat condition monitoring using remote sensing. This research will extend a feasibility study conducted as part of the GBA program to use remote sensing technology to monitor the condition of habitat in the Beetaloo SREBA region. It will also leverage the extensive data collection being undertaken through SREBA. The objective will be to develop an approach for routine assessment of habitat condition through time. | NT Beetaloo | $600K |
| **Water** | Following on from the now completed Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT, additional research is being considered to extend the pilot study and consider whether there are pathways for stygofauna to be impacted by gas development. | NT Beetaloo | $400K |

[22] This figure is total GISERA funding for Northern Territory less $5,046,861 already committed to research (tables 7.1 and 7.2) and less anticipated costs for the Director's office/Communications for the life of GISERA. The remaining research budget does not include future CSIRO in-kind contributions.

# 8 Western Australia R&D Plan & Budget

## 8.1 Western Australia Investment profile

### 8.1.1 Committed research investment for 2020/21-2024/25

The committed budget for projects in Western Australia for 2020/21-2024/25 now stands at $2,300,877. A breakdown of the committed research budget across the various research subject areas is illustrated in Table 8.1 and Table 8.2 shows the investment committed by contributor.

**Table 8.1 Committed research investment in Western Australia by research subject area, 2024/25**

| RESEARCH AREA | TOTAL RESEARCH INVESTMENT |
|---|---|
| Water (98%) | **$2,249,653** |
| Biodiversity (2%) | **$51,224** |
| **Total** | **$2,300,877** |

**Table 8.2 Committed research investment in Western Australia by contributor, 2024/25**

| CONTRIBUTOR | CONTRIBUTION TYPE | TOTAL RESEARCH CONTRIBUTION |
|---|---|---|
| CSIRO (16%) | In-kind | **$364,547** |
| Federal Government (21%) | Grant | **$481,530** |
| Geological Survey of Western Australia (50%) | 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** | | **$2,300,877** |

### 8.1.2 Western Australia Current Research Portfolio

A summary of all approved research projects in Western Australia is provided in table 8.3

**Table 8.3 Approved Western Australia Research Projects**

| RESEARCH SUBJECT AREA | RESEARCH PROJECT AND SCOPE | RESEARCH OUTCOMES | 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. | Results of this research will identify requirements for future investigation, characterisation and monitoring of groundwater systems. This work will build on and bring together previous groundwater studies in this region to understand the current status of groundwater knowledge for the entire basin. | Near completion |
| | 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. | This baseline study will distinguish any potential increase in seismic activity due to planned gas extraction operations from other seismic sources | To commence in 21/22 |
| Terrestrial 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. | This desktop study will identify the plants and animals that occur in the Canning Basin. Species and threatened ecological communities that are of conservation or cultural significance will be identified. This information will be used to identify knowledge gaps and recommend further investigations to fill these gaps. | Completed |

### 8.1.3 Western Australia Research Progress and Expenditure

The committed Western Australia research budget, expenditure and milestones completed for each project is provided in table 9.4. (* = completed projects).

**Table 8.4 Committed research investment, expenditure and progress in Western Australia, by project**

| RESEARCH SUBJECT AREA | PROJECT | ALLOCATED BUDGET | EXPENDITURE UP TO 30 JUNE 2021 | PERCENTAGE OF BUDGET SPENT UP TO 30 JUNE 2021[23] | PERCENTAGE OF MILESTONES COMPLETED UP TO 30 JUNE 2021 |
|---|---|---|---|---|---|
| Surface and Groundwater | Groundwater baseline study of the Canning Basin, Western Australia | $99,275 | $92,197 | 93% | 67% |
| | Baseline seismic monitoring of the Canning Basin | $2,150,378[24] | $0[25] | 0% | 0% |
| Terrestrial Biodiversity | Baseline assessment of the biodiversity of the Canning Basin, Western Australia* | $51,224 | $51,221 | 100% | 100% |
| **TOTAL ALLOCATED BUDGET** | | **$2,300,877** | | | |

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

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

[25] This is a newly approved project. Expenditure will be incurred in 2021/22.

## 8.2 Western Australia research ideas being discussed for 2021/22

Approximately $431,344[26] cash remains available for new project proposals to be initiated in FY 2021/22.

The following projects ideas 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 8.5 Future research ideas in Western Australia for 2021/22**

| SUBJECT AREA | IDEA | POTENTIAL STATE/TERRITORY | ESTIMATED COST |
|---|---|---|---|
| **Biodiversity** | Following on from a desktop study identifying gaps in knowledge of the biodiversity of the large expanse of the basin, a follow up project will be designed to improve characterisation in areas identified to be "High prospectivity areas for future exploration/operation". The project will seek to identify key locations in collaboration with GSWA and PEL holders for timelines and activities. Areas will be prioritised based on a number of factors (risk, sensitivity, habitat change, climate factors, accessibility). Some of these areas are likely to experience competing use (e.g., UHS, CCS, CAES, Solar farms, natural hydrogen and gas exploration). | WA Canning Basin | $200-300K |
| **Biodiversity** | Biocultural knowledge in the Canning Basin is not well documented. Determine culturally significant species and ecological communities/locations (not all identified yet). Use of senior elders and linguists together with biologists to identify these culturally significant species/communities/locations which have little or no data currently. Take this and results from first idea above and integrate understanding and provide knowledge exchange between local and western cultural information. | WA Canning Basin | $150-250k |
| **Water** | 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). This project seeks to evaluate the impact on groundwater of these resource conflicts to provide data on the utilisation of water in the basin and how it might be monitored and managed in the longer term. The project may include increased sampling of bores, water head, and best monitoring tools, and testing of monitoring by passive seismic approaches. By testing these different approaches locally, abundant data can be used to improve models and attribute use and quality impacts for different industries in the region. This will be a multi-year long term study from which optimized approaches can be transferred to other basins across Australia. | WA North Perth Basin | $350-550k |

[26] This figure is total GISERA funding for Western Australia less $2,300,877 already committed to research (tables 8.1 and 8.2) and less anticipated costs for the Director's office/Communications for the life of GISERA. The remaining research budget does not include future State Government contributions or CSIRO in-kind contributions.

# 9 Proposed management and communication budget for 2021/22

Table 9.1 shows GISERA's actual management and communications expenditure during 2011-12 to 2020-21 financial years and the proposed management and communications budget for 2021-22.

**Table 9.1 Proposed management and communications budget, 2021/22 with actual expenditure for 2011/12-2020/21**

| ITEM | ACTUAL EXPENDITURE | PLANNED EXPENDITURE | TOTAL |
|---|---|---|---|
| | 2011/12 - 2020/21 | 2021/22 | |
| Director, Deputy Director and State Leaders (salary & overheads) | $2,282,978 | $564,561 | **$2,847,539** |
| Communication & Engagement team (salary & overheads) | $1,923,551 | $727,121 | **$2,650,672** |
| Admin & Executive Officer support (salary & overheads) | $1,877,032 | $315,810 | **$2,192,842** |
| Contractors | $297,920 | $0 | **$297,920** |
| Travel & accommodation | $392,509 | $68,000 | **$460,509** |
| Factsheets, brochures infographics, videos | $117,608 | $113,000 | **$230,608** |
| Conferences | $57,531 | $26,500 | **$84,031** |
| Annual Symposium/Stakeholder & RAC meetings | $63,616 | $40,000 | **$103,616** |
| General Expenses & Annual report | $66,777 | $9,400 | **$76,177** |
| Public information sessions | $45,808 | $35,000 | **$80,808** |
| Media training | $26,287 | $31,500 | **$57,787** |
| Printing | $15,718 | $1,400 | **$17,118** |
| Office supplies | $12,682 | $1,300 | **$13,982** |
| Vodcasts | $3,000 | $0 | **$3,000** |
| Auditor | $0 | $0 | **$0** |
| **TOTAL** | **$7,183,018** | **$1,933,592** | **$9,116,610** |

**Table 9.2 Partner contributions to management and communications, with actual expenditure for 2011/12-2020/21 and proposed for 2021/22**

| COMMS & MNGT COSTS CONTRIBUTIONS | ACTUAL CONTRIBUTION | PLANNED CONTRIBUTION | TOTAL |
|---|---|---|---|
| | 2011/12 - 2020/21 | 2021/22 | |
| CSIRO | $3,198,347 | $421,523 | **$3,619,870** |
| Federal Govt | $1,372,794 | $1,295,507 | **$2,668,301** |
| NSW Government | $584,270 | $9,668 | **$593,938** |
| SA Government | $217,392 | $0 | **$217,392** |
| APLNG | $1,085,560 | $38,672 | **$1,124,231** |
| QGC | $203,150 | $13,535 | **$216,685** |
| Origin | $146,803 | $38,672 | **$185,475** |
| Santos | $196,121[27] | $38,672 | **$234,793** |
| AGL | $66,409 | $0 | **$66,409** |
| NT Government | $85,564 | $77,344 | **$162,908** |
| Pangaea | $26,607 | $0 | **$26,607** |
| **TOTAL** | **$7,183,018** | **$1,933,592** | $9,116,610 |

[27] Santos contributing to two regions

# 10 Communication

## 10.1 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 GISERA plays an important role in providing trusted information about the challenges and opportunities associated with the onshore gas industry.

Communication of CSIRO GISERA research has occurred using 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.

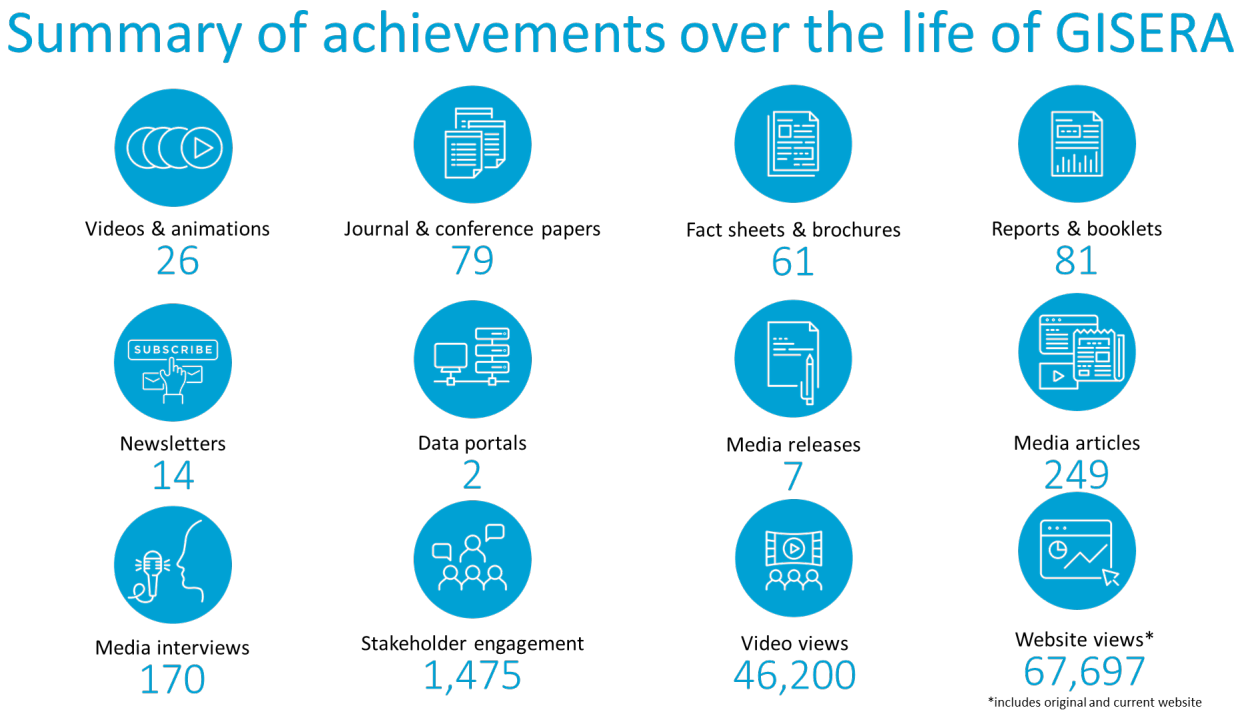


**Figure 6 Summary of achievements over life of GISERA**

## 10.2 Communication outputs

A suite of communication channels have been used to ensure effective and meaningful communication of research outcomes. Table 10.1 shows a range of communication outputs GISERA has achieved in 2020-21.

**Table 10.1 Summary of technical and general communication outputs in 2020-21**

| COMMUNICATION PRODUCT | NAME OF COMMUNICATION PRODUCT | STATE / TERRITORY | RELEASE DATE |
|---|---|---|---|
| Final report | Groundwater contamination risks from conventional gas in the southeast SA: Pathways, vulnerability and modelling analysis | SA | July 2020 |
| Final report | Potential impacts on groundwater resources from conventional gas in the South East of SA | SA | July 2020 |
| Literature Review | Sealant technologies for remediating cement-related oil and gas well leakage | NT | July 2020 |
| Statement | CSIRO's GISERA refutes misleading report | National | July 2020 |
| Newsletter | GISERA Newsletter - Issue 13 | National | August 2020 |
| Factsheet | Mapping future transport for improved planning and operation | NT | August 2020 |
| Statement | CSIRO's GISERA welcomes Federal funding | National | September 2020 |
| Factsheet | Investigating the environmental, social and economic impacts of conventional gas development in south east South Australia | SA | September 2020 |
| Factsheet | Safeguarding future groundwater use in South Australia | SA | October 2020 |
| Factsheet | Perspectives on risk to local markets and industries | SA | October 2020 |
| Factsheet | Microbial degradation of chemicals and fluids in aquifers | SA | October 2020 |
| Factsheet | The role of gas in South Australia | SA | October 2020 |
| Factsheet | Studying groundwater systems in the Canning Basin in Western Australia | WA | October 2020 |
| Factsheet | Assessing the biodiversity of the Canning Basin in Western Australia. | WA | October 2020 |
| Factsheet | Biodiversity impacts from roads and pipelines in the Beetaloo Sub-Basin | NT | November 2020 |
| Factsheet | Offsets for greenhouse gas emissions of onshore gas in the Northern Territory. | NT | November 2020 |
| Factsheet | Putting land management knowledge into practice in the Northern Territory | NT | November 2020 |
| Factsheet | Optimising wastewater management for onshore gas in the Northern Territory | NT | November 2020 |
| Journal Paper | Deep learning emulators for groundwater contaminant transport modelling | SA | November 2020 |
| Journal Paper | Quantifying methane emissions from Queensland's coal seam gas producing Surat Basin using inventory data and a regional Bayesian inversion | QLD | December 2020 |
| Knowledge transfer presentation | Characterisation of the stygofauna and microbial assemblages of the Beetaloo sub-Basin, NT | NT | February 2021 |
| Final Report | Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, Northern Territory | NT | February 2021 |

| COMMUNICATION PRODUCT | NAME OF COMMUNICATION PRODUCT | STATE / TERRITORY | RELEASE DATE |
|---|---|---|---|
| Final factsheet | Stygofauna and microbial assemblages of the Beetaloo Sub-basin, Northern Territory | NT | February 2021 |
| Joint media release with CDU | Tiny new species discovered as scientists' outback fishing trip bags exotic catch | NT | February 2021 |
| Article in The Conversation | Blind shrimps, translucent snails: the 11 mysterious new species we found in potential fracking sites | NT | February 2021 |
| Newsletter | GISERA Newsletter - Issue 14 | National | March 2021 |
| Final Report | Assessing and projecting onshore gas effects on regional economic activity in NSW | NSW | May 2021 |
| Factsheet | Assessing and projecting onshore gas effects on regional economic activity in New South Wales | NSW | May 2021 |
| Journal paper | Lessons from 5 years of GISERA economic research | National | May 2021 |
| Knowledge transfer presentation | Assessing and projecting onshore gas effects on regional economic activity in NSW | NSW | May 2021 |
| Final Report | Advancing new fracture sealing materials to assist mitigating fugitive gas emissions from well casings | NT | June 2021 |
| Final Report | Baseline assessment of the biodiversity of the Canning Basin, Western Australia | WA | June 2021 |
| Video | Predicting water flow - Putting Land Management into Practice, Beetaloo Sub-Basin, Northern Territory | NT | June 2021 |
| Info-graphic | Research progress to date | National | June 2021 |

## 10.3 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 1,475 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 10.3 outlines the engagements for 2020-21 and Figure 10.1 shows stakeholder interactions over the last 10 years.

**Table 10.2 Summary of GISERA engagements for 2020-21**

| STAKEHOLDER | NUMBER OF ENGAGEMENTS FOR 2020-21 | NUMBER OF ENGAGEMENTS OVER LIFE OF GISERA |
|---|---|---|
| Regional community | 40 | 136 |
| Gas Industry | 38 | 295 |
| Federal, State and Local Departments and Agencies | 57 | 436 |
| Media (includes print, TV and radio) | 47 | 213 |
| School/Educational institutions/Students | 0 | 17 |
| Research organisations | 13 | 184 |
| Industry associations | 5 | 127 |
| Business groups | 8 | 67 |
| **Total** | **208**[28] | **1,475**[29] |

[28] 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

[29] 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

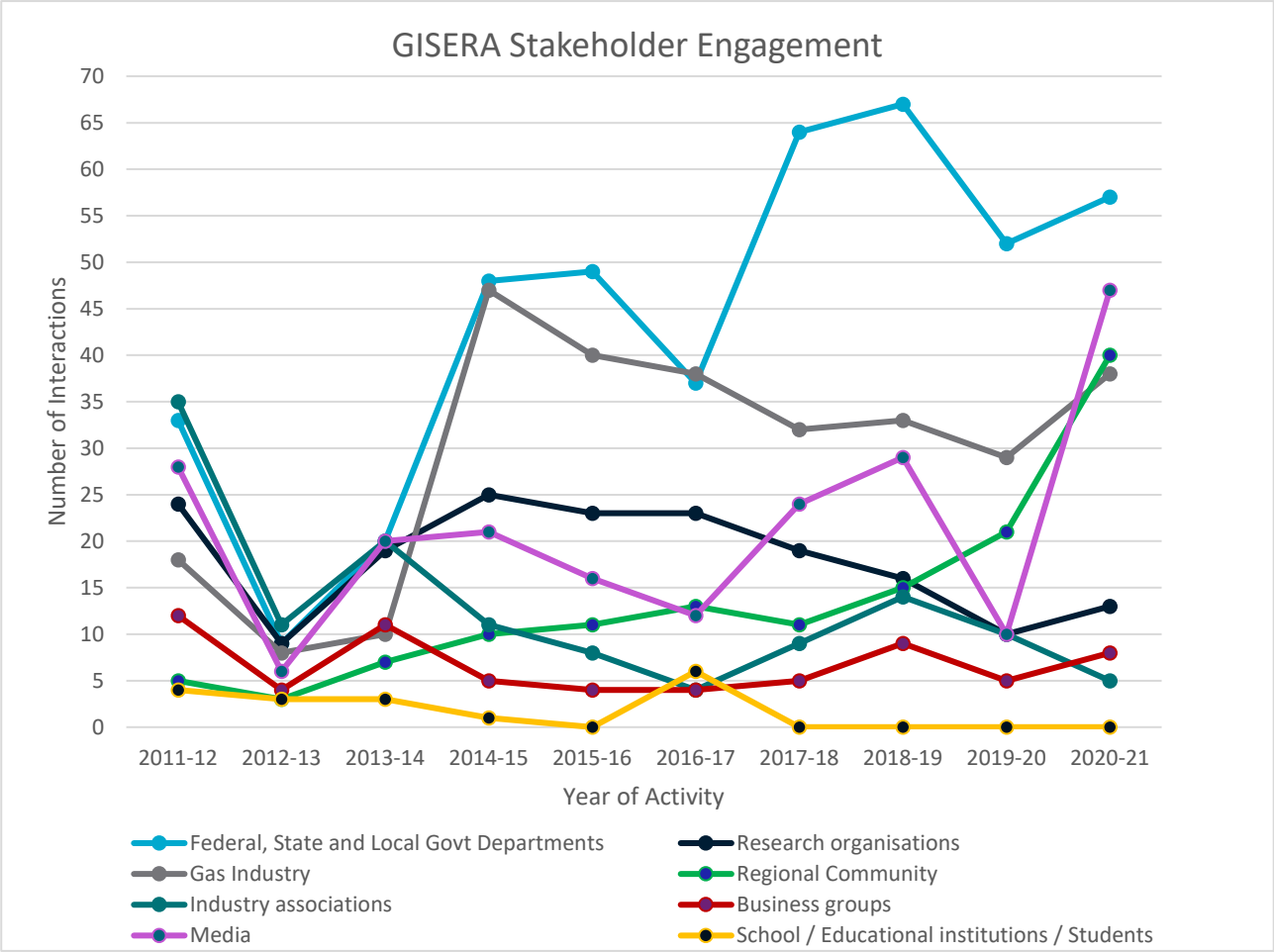


**Figure 10.7 Stakeholder interactions from 2011/12 to 2020/21 - These numbers do not take into account the number of individuals engaged in that interaction. Regional community group interactions can range from 20-360 participants and a gas industry interaction from 1-10 participants.**

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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.