Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Progress report

Understanding controls and constraints of potential microbially induced corrosion in onshore gas wells

Progress against project milestones

Progress against milestones/tasks are approved by the GISERA Director, acting with authority in accordance with the GISERA Alliance Agreement.

Progress against project milestones/tasks is indicated by two methods: Traffic light reports and descriptive Project schedule reports.

1. Traffic light reports in the Project Schedule Table below show progress using a simple colour code:

- **Green**:
  - Milestone fully met according to schedule.
  - Project is expected to continue to deliver according to plan.
  - Milestone payment is approved.
- **Amber**:
  - Milestone largely met according to schedule.
  - Project has experienced delays or difficulties that will be overcome by next milestone, enabling project to return to delivery according to plan by next milestone.
  - Milestone payment is withheld.
  - Milestone payment withheld for second of two successive amber lights; project review initiated and undertaken by GISERA Director.
- **Red**:
  - Milestone not met according to schedule.
  - Problems in meeting milestone are likely to impact subsequent project delivery, such that revisions to project timing, scope or budget must be considered.
  - Milestone payment is withheld.
  - Project review initiated by GISERA Director.

2. Progress Schedule Reports outline task objectives and outputs and describe, in the 'progress report' section, the means and extent to which progress towards tasks has been made.

Project schedule table

TASK NUMBER	TASK DESCRIPTION	SCHEDULED START	SCHEDULED FINISH	COMMENT
1	Sampling logistics and planning	1 Jul 2024	31 Aug 2024	Complete
2	Sampling campaign	1 Sept 2024	31 May 2025	Complete
3	Water chemistry analyses	1 Dec 2024	31 May 2025	Complete
4	Microbial community profiling	1 Nov 2024	31 July 2025	Underway
5	RNA sequencing for microbial activity	1 Nov 2024	31 July 2025	
6	Project management, data analysis and reporting	1 Jul 2024	30 Sep 2025	
7	Communicate findings to stakeholders	1 Jul 2024	30 Sep 2025	

Project schedule report

TASK 1: Sampling logistics and planning

BACKGROUND

The project's TRG and other industry contacts will be consulted to guide the sampling campaign to ensure that appropriate and representative water and swab samples are collected from onshore gas-related, agricultural and domestic bores/wells/infrastructure. Preparation of sampling equipment and reagents, and subsequent transport to sampling region. This task may include travel to the region to liaise with onsite contacts in industry, government and local stakeholders.

TASK OBJECTIVES

Identification of sites for water and swab sampling to ensure adequate representative samples from the south central Queensland region.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

This task will yield a series of documents describing the contacts, sampling sites, relevant permissions, sampling equipment and OH&S considerations for the sampling campaign.

PROGRESS REPORT

This milestone is complete.

Stakeholders have been identified for samples from the region including two gas industry operators, multiple domestic groundwater bores and multiple agricultural bores. Presentations and discussions on the project were given to CSG producers, governments and landowners regarding chemical use and safety issues. Two gas industry companies, two local governments in the region and three landholders have agreed to help facilitate sampling. Sampling was partially completed in early April 2025 with the final samples to be collected the week of the 19th of May.

TASK 2: Sampling campaign

BACKGROUND

Task 2 will involve at least two staff traveling to south central Queensland with the purpose of collecting representative water and swab samples across the region from onshore gas-related, agricultural and domestic bores/wells/infrastructure.

TASK OBJECTIVES

To collect groundwater and swab samples from sites identified in Task 1, for the purpose of water chemistry analyses (Task 3) and microbial DNA sequencing (Task 4). All water and swab samples collected for microbial DNA sequencing will be microbially preserved in a preservation solution.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Collection of water and swab samples for analyses of microbial community profiles and water chemistry within south central Queensland. The sampling campaign will aim to collect from each of ten sites representing onshore gas- related, agricultural and domestic bores (30 sites in total).

PROGRESS REPORT

This milestone is complete.

The sampling campaign has been completed. The collections included groundwater samples from multiple gas industry sites (from multiple operators), two local councils (Western Downs Regional Council and Toowoomba Regional Council) and multiple landholder bores. The samples also included swabs of internal surfaces of casings which will be used for DNA and RNA work to establish microbial presence and activity, respectively. Further, all samples were also subsampled for water chemistry in the field and were sent to our testing provider.

TASK 3: Water chemistry analyses

BACKGROUND

Water chemistry will be carried out on all bulk water samples by a NATA accredited external laboratory.

TASK OBJECTIVES

The task will provide complete water chemistry data and analysis for all bulk water samples collected in Task 2.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Water chemistry data from all water samples will be provided in a technical brief.

PROGRESS REPORT

This milestone is complete.

All water chemistry analysis is complete. Blind testing was done at a NATA-accredited laboratory (Australian Laboratory Services) for a range of analytes. For this project this included: pH, EC, major anions and cations, a range of metals, total nitrogen, total phosphorus and a range of sulfur pools including: sulfate, sulfite and sulfide. In addition, a range of carbon pools were also

examined including total organic carbon, total inorganic carbon and suite of volatile organic compounds. Data are with the project team.

TASK 4: Microbial community profiling

BACKGROUND

The microbially preserved water samples and the swab samples will be subject to DNA extraction along with 16S rDNA sequencing.

TASK OBJECTIVES

The task will include the following objectives:

1) Complete DNA extractions from all samples;
2) DNA samples prepared and sent to external sequencing provider; and
3) Bioinformatics completed for all sequenced samples.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Raw sequencing data from microbial community profiling available.

PROGRESS REPORT

This task is progressing.

All samples have been filtered for DNA extraction through 0.1 micrometre filters. DNA extraction is underway and should be completed by July 2025.

TASK 5: RNA sequencing for microbial activity.

BACKGROUND

A selected subset of the microbially preserved water samples and the swab samples will be subject to RNA extraction along with 16S rRNA sequencing and RNA transcriptomic sequencing. The task will aim to select one paired sample from each of the onshore gas-related, agricultural and domestic bores (sum total of 18 samples).

TASK OBJECTIVES

The task will include the following objectives:

1) Complete RNA extractions from a selected subset of the microbially preserved water samples and the swab samples;
2) Make cDNA libraries from RNA extractions;
3) cDNA samples prepared and sent to external sequencing provider; and
4) Bioinformatics completed for all sequenced samples.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Raw transcriptome and rRNA data available.

PROGRESS REPORT

This task will be completed in July 2025.

TASK 6: Project management, data analysis and reporting

BACKGROUND

The final report for this project will collate microbial and chemistry data. These data will inform requirements for future research and will provide information for a range of stakeholders.

Critical evaluation of the results is needed to understand the outcomes of this study.

TASK OBJECTIVES

The task will include the following objectives:

1) Reporting results and analyses from Tasks 3-5;
2) Provide research options for potential hazards of microbial activity on well infrastructure materials.
3) Undertake a synthesis that considers the potential hazard and the likelihood of impacts to casing materials and in turn well integrity. Factors to be considered include microbial capabilities, microbial activity under well conditions, materials used for well completion and industry practices.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

1) Preparation of a final report outlining the scope, methodology, scenarios, assumptions, findings and any suggestions/options for future research;
2) Following CSIRO ePublish review, the report will be submitted to the GISERA Director for final approval; and
3) Provide 6 monthly progress updates to GISERA office.

PROGRESS REPORT

This task will be completed in September 2025.

TASK 7: Communicate project objectives, progress and findings to stakeholders

BACKGROUND

Communication of GISERA's research is an important component of all research projects. The dissemination of project objectives, key findings and deliverables to relevant and diverse audiences allows discourse and decision making within and across multiple stakeholder groups.

TASK OBJECTIVES

Communicate project objectives, progress and findings to stakeholders through meetings, Knowledge Transfer Session, fact sheets, project reports and journal article/s, in collaboration with GISERA Communication Team.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Communicate project objectives, progress and results to GISERA stakeholders according to standard GISERA project procedures, which may include but are not limited to:

1) Knowledge Transfer Session with relevant government/gas industry representatives.

2) Presentation of findings to community stakeholders / landowners (virtual or face-to-face).

3) Face-to-face discussion on results with Queensland regulator

4) Preparation of an article for the GISERA newsletter, and other media outlets as advised by GISERA's communication team.

5) Two project fact sheets: one developed at the commencement of the project, and another that will include peer-reviewed results and implications at completion of the project. Both will be hosted on the GISERA website.

6) Peer-reviewed scientific manuscript ready for submission to relevant journal

PROGRESS REPORT

This task will be completed in September 2025.

Variations to Project Order

Changes to research Project Orders are approved by the GISERA Director, acting with authority, in accordance with the GISERA Alliance Agreement. Any variations above the GISERA Director's delegation require the approval of the relevant GISERA Research Advisory Committee.

The table below details variations to research Project Order.

Register of changes to Research Project Order

DATE	ISSUE	ACTION	AUTHORISATION
08/05/25	Delays during negotiations with stakeholders to obtain samples for the project.	Milestone 2 pushed back from November 2024 to May 2025. Milestone 3 pushed back from December 2024 to May 2025. Milestone 4 pushed back from March 2025 to July 2025. Milestone 5 pushed back from March 2025 to July 2025.	

		Milestone 6 pushed back from April 2025 to September 2025. Milestone 7 pushed back from April 2025 to September 2025.	

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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.