



Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Progress report

Potential health impacts from CSG



Australian Government
Department of Industry, Science,
Energy and Resources



Supported by
Government of
South Australia



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	Governance and ethics	May-18	Jul-18	Completed
2	Scoping	July-18	Sept-18	Completed
3	Identification progress milestone	July-18	May-20	Completed
4	Identification final	Jun-20	Sept-20	Completed
5	Stakeholder consultation on communicating identification outcomes	Oct-20	Oct-20	Completed
6	Final Reporting and engagement activities	Sept-20	Nov-20	The final report will be released following completion of extension tasks 1-3 below.
Extension Task 1	Sampling	Mar-22	Apr-22	Completed
Extension Task 2	COPC degradation trials in soil and water	Apr-22	Sept-22	Completed
Extension Task 3	Reporting	1 Sept-22	30 Sept-22	This task will be complete February 2023.

Project schedule report

TASK 1: Governance and ethics

BACKGROUND

The governance structure for this project, as recommended by the health study framework, addresses community stakeholders' views on ensuring a health study is independent and trustworthy. The governance structure is shown in Figure 2 and will be included as part of the ethics approval for this project. Submission of the ethics approval will be a key component of this task.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Defined study location and research objectives. Communication plan. Prioritisation / decision making tool. Detailed plan for the remainder of the identification stage (task 3).

A brief report describing the outcomes of the workshop, the site selected, and specific research objectives identified and the reasons for their selection. Project plan for the identification stage.

TASK OBJECTIVES

Obtaining ethics approval for the project. Establishment of the project governance structure, including oversight committee, joint steering committee, community reference group and technical reference group. Development of a communication plan and proposed prioritisation /decision making tool to take to the community reference group and relevant technical reference groups.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Ethics approval, terms of reference for committees, and draft communication plan and prioritisation/decision making tool for discussion. A brief report outlining the governance structure and draft prioritisation/decision making tool.

PROGRESS REPORT

This milestone is now complete. This milestone report is a progress report on activities around project governance.

TASK 2: Scoping

BACKGROUND

An important aspect of the approach engaging with stakeholders in a transparent, participatory and independent process is to provide the community reference group to have input into the final scope of the project. The project needs to work within the resources available to it, and this will require a prioritisation of the research objectives. A workshop will be held with the community reference group to provide an overview of the project and to get their input into the draft communication plan and prioritisation / decision making tool, final site selection and prioritisation of specific research objectives. The aim is to ensure that the research project addresses their highest priority concerns, within the context of the framework. The project team will present options to the community reference group for the site and research objectives based on their knowledge and potential health concerns raised in other GISERA and CSIRO research or identified by government agencies (Gasfields Commission, Queensland Health). The prioritisation/decision making tool developed in task 1 will be used to define priorities for the remainder of the project.

TASK OBJECTIVES

Delineate the study location and research objectives with endorsement from the community reference group. Refinement of communication plan and prioritisation / decision making tool from the community reference group and technical reference group(s). Development of detailed plan for the identification stage for approval by the joint steering committee.

PROGRESS REPORT

This milestone is now complete. The study location and research objectives have been defined. The communication plan is in place, although further refinement with new GISERA communications staff is likely. The prioritisation / decision making process has been agreed with the Local Stakeholder Reference Group and Technical Reference Group. Initial data reconnaissance has been completed and a detailed plan for the remainder of the identification stage prepared.

TASK 3: Identification progress milestone

BACKGROUND

The identification task has proven to be a significantly larger task than originally planned. A significant amount of work has been completed, however there is still a considerable amount to do. To allow closer monitoring of the final stages, this task has been divided into two. Task 3 is a progress milestone to allow work conducted up to the end of May 2020 to be reported on as a project management step.

The identification stage will establish a comprehensive profile of the study region. Critical information for the Identification stage for chemical and physical stressors includes the nature and locations of CSG activities and infrastructure and community resources/services and residential dwellings; regional geology, pedology and hydrogeology, atmospheric composition and meteorology; topography and environmental setting; CSG industry practices, controls in place and incidences of accidents and other non-compliance issues; profile of the population; nature, source and exposure routes of chemical and physical factors from CSG activities; and confounding factors in the region. This site-specific information enables the identification of factors relevant to the site and establishes which of these factors have plausible complete human exposure pathways.

The H.1, Human Health effects of Coal Seam Gas Activity Study Design provides an overall framework for the conduct of a health study but does not contain a detailed methodology for the appraising whether factors identified constitute a potential hazard to human health. The project will develop a refined approach that can be applied methodically to all factors ensuring a consistent and robust appraisal.

Factors will be appraised using this method and the results presented as a series of technical fact sheets that describe the factor, whether it is considered a potential hazard, and the evidence upon which the appraisal is based. The project will appraise between 180 and 230 separate factors. The primary focus is on factors related to chemicals used within CSG activities (such as drilling additives and chemicals used in water treatment), geogenic chemicals that may be mobilised by CSG activities (such as produced water) and air emissions (raw gas and combustion products). Factors related to dust, noise, vibration, and light will also be appraised as a lower priority.

Engagement with the project's Local Stakeholder Reference Group and Technical Reference Group will be conducted throughout this task.

TASK OBJECTIVES

To progress the appraisal of factors related to CSG activities in the study site and to finalise the site profile, documentation of the appraisal methodology and to demonstrate continued progress on the revised scope for the project.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Completion of the site profile, study methodology and progress report on the appraisal of factors.

Interim report to the GISERA Director and project Steering committee containing the site profile, study methodology and progress report on the appraisal of factors.

PROGRESS REPORT

This milestone is 100% complete. The following activities have been conducted as part of task 3:

- 6 meetings with the Local Stakeholder Reference Group (LSRG). These meetings have been invaluable in understanding community concerns in regard to the potential impacts of CSG activities on human health and how to communicate the findings of the research to a broader audience stop
- 2 meetings with the Technical Reference Group (TRG). These meetings of invaluable confirming the methodology for appraising CSG activities for potential hazards to human health.
- Compilation of literature on chemicals used in and produced by CSG activities in Australia. This dataset allows comparison of the site-specific data with the broader industry.
- Engagement with the two operators of CSG activities within the study area to request data. Over the course of Task 3 the datasets that have been received include:
 - spatial information on the location of CSG infrastructure within the study area
 - drilling additives used in wells within the study area (over 2,000 wells)
 - hydraulic fracturing additives used in wells within the study area (only a small proportion of wells in the study area have been hydraulically fractured ~67 wells)
 - water chemistry data (produced water and treated water)
 - information on water treatment facility operations and the chemicals used within them
 - air emissions data
 - noise and light management plans
- Evaluation of data provided by industry allowing the project team to conclude that the dataset is representative of the activities undertaken within the study area, although not comprehensive.
- Collated information in the study area for a site profile
- Held a workshop was held to discuss approaches for communicating human health risk. The communication of the results of this project to a broad audience is a critical component
- Further refined the health study framework to provide a methodology for the appraisal of various factors associated with CSG activities. These factors have been broken down into the following five categories:
 - Chemicals added as part of CSG activities (such as drilling additives, chemicals used in water treatment)
 - Geogenic chemicals that may be mobilised or that humans may be exposed to as a result of CSG activities (produced water)
 - Air emissions (primarily combustion products from diesel engines, gas powered engines and flares and gas that is vented or leaks from infrastructure)
 - Dust
 - Other physical factors (noise and light)
- Developed a standard fact sheet format for factors to allow the information used to appraise them to be presented in a consistent way

- As at the end of May, over 120 chemical factors have been identified for appraisal, and drafts of 110 fact sheets have been completed.

TASK 4: Identification final

BACKGROUND

This is a continuation of Task 3 – Identification

TASK OBJECTIVES

Finalisation of the appraisal of factors related to CSG activities in the study site and development of a conceptual site model to illustrate any potential hazards identified and their pathways to human exposure.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Technical fact sheets for approximately 180 to 230 factors identified in the study site and the conceptual site model.

A dataset that presents the conceptual site model and technical ‘fact sheets’ all factors assessed in a standard format (the fact sheets and a discussion of the key findings will be published in the final reporting task (task 6)).

PROGRESS REPORT

According to the variation to this project approved by the Queensland RRAC in April 2020, Task 4 was rescoped to be Identification final and was due for completion at the end of September 2020. This task is very nearly complete, however ongoing productivity issues due to COVID-19 restrictions and delays in obtaining a few vital components of data have delayed the completion of this task. The appraisal of factors associated with drilling and hydraulic fracturing is complete. Appraisal of factors associated with produced CSG water and treated CSG water is nearly complete. Appraisal of factors associated with air emissions is also nearly complete and builds on past work conducted on air quality by CSIRO GISERA. It is anticipated that this task will be finalised by early November 2020. It is not expected to impact the stakeholder engagement (task 5) and final reporting (task 6) components of the project.

TASK 5: Stakeholder consultation on communicating identification outcomes

BACKGROUND

The current project is designed to identify chemical or physical hazards related to coal seam gas activities. This is an essential step in investigating whether any potential human health impacts exist, and the results of this study will allow stakeholders to determine appropriate means of addressing the hazards identified. A risk communication workshop held as part of the project identified that there is potential for the results of the study to cause community concern if they are presented without suitable context and without any indication of how any hazards identified will be addressed. Similar concerns have also been expressed by the project’s Local Stakeholder Reference Group.

Identified hazards may be addressed through further research (a full assessment potential impacts from hazards identified), however this would require the establishment of suitable research

projects and other intervention by regulators or industry. All of these options will require key stakeholders to make informed decisions about how to progress, and it is not appropriate for the project team to mandate particular courses of action on their behalf.

Engagement with these stakeholders is a normal part of GISERA's activities, however this usually takes place closer to the publication of the final results of GISERA projects. Timely engagement with relevant stakeholders is required so that they can prepare their own responses and provide context to the research in addition to that provided in the project's deliverables and in GISERA communications.

This task is in addition to ongoing engagement with the project's Local Stakeholder Reference Group and Technical Reference Group.

TASK OBJECTIVES

To present the results of the identification stage of the project to industry and government stakeholders to allow them time to prepare an appropriate response to the findings of the project. The terms of reference of this engagement will be about the project team informing industry and government of the project's key findings, and a discussion of possible future steps.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Workshop material for engagement with industry and regulators about the findings of the project.

In the interests of transparency, a summary of this engagement will be included in the project's final report.

PROGRESS REPORT

This milestone is complete. The project team have held several workshops with key stakeholders to discuss communication issues associated with this project. While GISERA will maintain an independent communications approach, these workshops have been useful for discussing potential issues and how enquiries will be managed. A summary of this engagement will be included in the final report for the project (Task 6).

TASK 6: Final reporting

BACKGROUND

This project will be the first comprehensive study of potential impacts on human health from CSG activities. It is important that there is a summary of the project overall prepared in a manner that is accessible to a wide audience. It will also be important to present the study's findings to the community reference group and other stakeholders. Identifying priorities for further research will also be important.

TASK OBJECTIVES

Development of a final report and other communications activities, including a workshop with the community reference group and a knowledge sharing session.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Communications material to present the findings of the study to a wide audience.

A report that summarises the overall project that includes an overview of the project and the methodology of each stage and task, a discussion of the conceptual site model and hazards, a

discussion of the data available to assess these hazards (from the screening stage), conclusions that can be drawn based on these data, recommendations for further assessment of hazards and exposure pathways that warrant investigation in follow up health studies, and lessons learned to assist in the planning of future health studies. A fact sheet on the project's results. A workshop with the community reference group. A knowledge transfer session with government and industry stakeholders.

PROGRESS REPORT

The final report will be released following completion of extension tasks 1-3 below.

EXTENSION TASK 1: Sampling

TASK OUTLINE

- Field sampling with assistance from two landowners will be conducted to obtain two bore water and two soil samples
 - Water from bores used for stock or irrigation purposes by the landowner
 - Soils to be obtained from agricultural fields
 - Sufficient samples for chemical testing and measurement of COPC, where available
- Detailed chemistry of two water and two soil samples to be done
- DNA extraction for microbial community profiling of two water and two soil samples to be done

PROGRESS REPORT

This task is complete. Two landowners were contacted for sampling, however, only one landowner was available for the collection of samples. The available landowner provided access to two locations, one at Victoria Park and one at Condamine. At each location water and soil samples were collected. A total of two water and two soil samples were obtained for chemical testing and measurement of COPCs.

Detailed chemical analyses for two water and two soil samples has been completed. There were some marked differences between soil samples, particularly in the analytes pH, electrical conductivity, bromide, sulfate, chloride, and sodium. The water samples also showed some marked differences in the before mentioned analytes.

During development of the extension work, a NATA accredited laboratory was engaged to carry out chemical analyses for all COPCs. Chemical degradation trials in water and soil microcosms have been established and are currently incubating. Assessment of degradation will be carried out by measurement of chemical concentrations at the beginning and end of microcosm trials using a NATA accredited laboratory. With this approach, microbial community profiling is no longer required and will not be carried out.

Samples for initial chemical concentration measurements have been prepared and supplied to the NATA accredited laboratory.

EXTENSION TASK 2: COPC degradation trials in soil and water

TASK OUTLINE

Replicated (n=10) microcosm degradation trials in both soil (n=2) and water (n=2) for all COPC (n=8). Total of 320 microcosms will be incubated for 1 month in the case of soils and 3 months in the case of water.

PROGRESS REPORT

This milestone is complete.

COPC microcosm degradation trials for both soil and water samples have been completed. Chemical analyses of the COPC degradation have also been completed and a brief technical report for this work is in preparation. It is expected that the report will be available by the end of October.

EXTENSION TASK 3: Reporting

TASK OUTLINE

- Baseline chemical analyses for water and soil samples, including COPC measurement, where available
- Baseline microbial community profiling for water and soil samples
- COPC degradation trials
 - Assessment of degradation of 8 COPC in both water and soil samples
 - Percentage reduction in COPC in microcosm trials, where chemical analyses are available

Assessment of microbial community profiling and microbial catabolism of COPC

PROGRESS REPORT

This task will be complete February 2023.


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
9 April 2020	Due to project team's broad and comprehensive data requests and significant challenges bringing together a database that is representative of all the activities that have happened across industry in terms of its development at the study site in the Surat region, some re-scoping of milestones 3-6 is required.	There has been rescoping of some of project activities done with input from the Local Stakeholder Reference Group (LSRG), the Technical Reference Group (TRG)	The QLD RRAC approved the project variation including the additional \$172,599 funding. Refer to <i>Minutes</i> .

	<p>Additional funding is required to cover:</p> <ul style="list-style-type: none"> • The higher-than-expected workload in the identification stage. CSIRO's collaboration agreement with the QAEHS will be extended to allow for the completion of this task. • Additional workshops to engage with industry and regulatory stakeholders about the findings of the identification tasks. • The time extension of the project and the associated overheads. • Additional resources for the final reporting and additional engagement activities. 	<p>and the Steering Committee.</p> <p>An additional \$172,599 (\$138,479 GISERA funding and \$34,120 CSIRO funding) is allocated to complete the project.</p>	
<p>2 March 2022</p>	<p>The project team have requested an additional 3 tasks be incorporated to conduct follow on assessments of factors identified in the current project.</p>	<p>The project team's intention is to complete this extension work and then release all project results together.</p> <p>An additional \$101,531 (\$80,717 GISERA funding and \$20,814 CSIRO funding) is allocated to complete this project taking the overall budget from \$1,022,892 to \$1,124,423.</p>	

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Contact us

1300 363 400
+61 3 9545 2176
csiro.au/contact
csiro.au

For further information

1300 363 400
gisera.csiro.au

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.