Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Progress report

Putting land management into practice

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

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	Establish project	Jul 2020	Sep 2020	Completed
2	Field work	Oct 2020	Mar 2021	Completed
3	Engagement	Apr 2021	Sep 2021	Task progressing. Will be completed by August 2022.
4	Reporting and Knowledge transfer	Oct 2021	Aug 2022	Project completion by August 2022.

Project schedule report

TASK 1: Establish Project

BACKGROUND

This project team includes staff from multiple business units, scientific disciplines and sites, and an external contractor. Furthermore, this project team will need to establish links with local industry, select case study sites and develop project plans and protocols for project work at remote locations. That being the case, a significant level of communication and organisation is required in establishing the project. A subcontract is required to engage the contractor for digital technologies. Finally, it is critical that the case study location is well chosen to ensure that it is undertaken in an area capturing existing infrastructure development and where future development designated to occur. Furthermore, site selection will need to include input from key stakeholders from the community, gas industry and agriculture and approval by landholders. The technical reference group will play an important role in this process. This will improve impact of work, in particular around communications. Further engagement with NT Department of Environment and Natural Resources will be undertaken to ensure links with ongoing work on soils and pastures within the area of interest. All these efforts are required early in the project in order to allow any aerial surveys prior to the wet season.

TASK OBJECTIVES

1) Initial team meeting, 2) Sub-contract established with sub-contractor, 3) Build links with local gas and agricultural industry and 4) Planning for aerial survey.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Short progress report outlining outcomes of project meeting and initial engagements with external collaborators.

PROGRESS REPORT

This milestone (establish project) is 100% complete.

The Technical Reference Group (TRG) has convened with two members from the gas industry and one member from the NT Department of Environment and Natural Resources. The meeting of the TRG also included two CSIRO staff involved in project management and logistics, and a representative of the sub-contractor involved in the conduct of the aerial survey. The case study location has been chosen and will ensure that the case study is completed in an area with a high probability of development which is suitable for project logistics (e.g. access roads). The exact dimensions of the case study will be finalised just prior to the aerial survey pending final decisions on flight logistics. Longterm data derived from Landsat satellite imagery has been used to evaluate vegetation dynamics for a much larger areas surrounding the proposed case study location to ensure the case study represents much of the variability in vegetation found within the area. The aerial and ground surveys are anticipated to be complete within October 2020.

The sub-contractor agreement with Agronomeye has been executed.

TASK 2: Field Work

BACKGROUND

An aerial survey is required to build the "digital twin" of the chosen case study site. On ground land condition assessments are required for testing of long term spatial layers to be developed from satellite imagery. Information on important soil types is required for communication to stakeholders. A communication plan will be required for efforts to turning "knowledge into practice". The outcomes of this phase will be used to determine continuation to further stages of community engagement and knowledge transfer.

TASK OBJECTIVES

1) Aerial survey of chosen case study location, 2) Processing of imagery into "digital twin" of the chosen case study location, 3) Development of spatial datasets for erosion risk and grazing land condition, 4) Development of on-line platform to allow stakeholders to immerse themselves in the data, 5) Development of a plan to use the developed capability in communication processes with stakeholders, 6) Demonstration of project capability and approval to continue to final stages of the project.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

Short progress report outlining outcomes of aerial survey and spatial analyses and plans for communication. A demonstration of the initially developed capability will be provided through online interaction with the digital twin as an example of methods for communicating environmental issues to stakeholders.

PROGRESS REPORT

This milestone is 100% complete.

Digital Twin

The study area location (near Dunmarra, approximately 60km South West of Daly Waters) was determined following consultation with the project's Technical Reference Group. An aerial survey was then undertaken to derive high resolution vegetation and soil surface elevation maps. The

images from the aerial survey were combined with other data to develop a 'digital twin' of the location, where environmental processes for soils, water flows and pastures can be explored.

The digital twin developed for the 16km x 16km case study area within the Beetaloo Basin was acquired at 15cm resolution and processed to provide an ability to explore the region interactively. The digital twin is accessed via a normal internet browser via the third party engaged for the study. The system can be easily navigated via virtual flyover, with various data layers displayed directly over the 3D landscape.

Water Flow Path Predictions

Data from the aerial survey was used to create a 3D model of the soil surface with which a comprehensive analysis was undertaken to provide water flow path predictions. These data have been uploaded into the platform for online visualisation. Data quality issues have impacted on the predictions in some parts of the case study. However, some areas were found to provide suitable data for effective visualisation of water flow paths and catchment processes.

Land Condition Maps

Long term satellite data have been processed for a much larger area of potential gas development within the Beetaloo. On-ground surveys were undertaken at the time of the aerial survey to provide training data for algorithms to predict land condition. A range of land types were chosen within the survey area and, within each, several transects were walked by members of the team documenting the spatial patterns of soil (surface quality and evidence of hydrological behaviour), litter (cover), pasture (cover, biomass and pasture type) and trees (cover and type). Observations were adjusted via calibration data obtained on the day to quantify and adjust predictions for observer biases. These data were then incorporated into the land condition modelling to provide broad-scale land condition maps which also included the case study location. These maps have also been incorporated into the digit twin, allowing users to explore the property, but also to identify areas of high erosion risk where water flows and unprotected soils coincide.

Demonstration Video

A short video has been created to demonstrate the capability of the tools developed for the case study site. The video has been targeted at a general audience, with some basic description of the types of approaches used to generate the datasets. It is hoped that such a video will also be valuable in any future communications activities with various community groups.

The video can be viewed at

https://gisera.csiro.au/project/putting-land-management-knowledge-into-practice/

Communications Plan

The remainder of the project includes two main communications efforts. The first includes community engagement to communicate knowledge and lessons from other gas developments. The second contains the final knowledge transfer process during which the project team will communicate back to the GISERA Stakeholders the lessons from the technology development and community engagement, and provide a final report to document these clearly.

Before proceeding, we note here that this project assumes that lessons from research in other regions will have relevance to the Northern Territory. Whist the climate, environmental

conditions, farming and gas developments are indeed different, the lessons chosen to be communicated by the team are likely to remain relevant. Some environmental issues, such as soil protection and erosion processes have already been highlighted as important by the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory. Other messages, such as lessons on the importance of good communications, and ways to improve communications between persons from agricultural and non-agricultural backgrounds are likely to be relevant in nearly all developments. Finally, the project team is well practiced in listening to the audience to explore differences when they are raised. Where differences do exist, they can serve as a good discussion-starter for open exploration by all parties within the engagement.

Planning Process

The team will engage with key members of the Technical Reference Group and Research Advisory Committee prior to any community communications efforts to determine the best means to achieve project outcomes. Communications may be impacted by travel limitations due to the COVID-19 pandemic, availability of key stakeholders during different times of the year, availability of high-speed internet at some locations, project resources, large distances for travel for both stakeholders and project staff from Queensland and New South Wales, and the need to work alongside other communications within this area to avoid confusion or maximise effectiveness in messaging. Because of this, a six-month period has been incorporated into the project plan to ensure adequate time for coordinated planning.

Stage Gate Demonstration to NT RRAC

On 10 June 2021, the NT Regional Research Advisory Committee were presented with a demonstration of the application of the technology which resulted in approval for the project proceeding to stage two of project as detailed in the original Project Order.

TASK 3: Engagement

BACKGROUND

This project aims to convert knowledge derived from previous research into improved practice for the design and maintenance of gas development. This phase of the project will take the tools developed using a case study in the region in planned communications exercises with stakeholders. An initial capability will be developed during Task 2 and this will be enhanced further prior to community communications. Engagement with NT Department of Environment and Natural Resources will assist with relevant and consistent messaging with stakeholders.

TASK OBJECTIVES

To conduct communications exercises according to the plan developed in Task 2.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

A short report outlining the communications exercises undertaken and some key feedback provided by participants.

PROGRESS REPORT

Task progressing. Will be completed by end of August 2022.

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
12/05/22	Due to covid border restrictions travel to the NT has been delayed.	Milestone 4 delivery date extended from March 2022 to August 2022.	

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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.