

BEETALOO SREBA SCOPE OF WORKS GREENHOUSE GAS

Methane and Greenhouse Gas studies for the Beetaloo Sub-basin
Strategic Regional Environmental and Baseline Assessment

Acronyms	Full form
AAPA	Aboriginal Areas Protection Authority
AEMS	autonomous monitoring station
BRRG	Beetaloo Regional Reference Group
CH4	Methane
C2H6	Ethane
DEPWS	Department of Environment Parks and Water Security
Final Report	The Final Report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory
GHG	Greenhouse gas
GIS	Geographic information system
NT	Northern Territory
SREBA	Strategic Regional Environment and Baseline Assessment

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BACKGROUND

In April 2018, the Northern Territory Government accepted all 135 recommendations of the Final Report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory.

The Final Report and details about the Inquiry are available at: frackinginquiry.nt.gov.au/inquiry-reports/final-report

A number of the recommendations relate to undertaking a Strategic Regional Environmental and Baseline Assessment (SREBA). A SREBA is a set of studies to address knowledge gaps and establish appropriate baselines against which the potential impacts of proposed onshore gas activities may be assessed. SREBA baseline studies cover six broad domains: water quality and quantity; aquatic ecosystems; terrestrial ecosystems; greenhouse gases; environmental health; and social, cultural and economic studies.

The Northern Territory Government has subsequently developed a SREBA Framework, which describes the objectives and content of a SREBA, including governance and implementation arrangements, and has detailed guidance notes describing how baseline studies should be undertaken in each domain.

The Framework is available at: hydraulicfracturing.nt.gov.au/resources/sreba

The Northern Territory Government has determined that a SREBA is required in the Beetaloo Sub-basin, which is the most prospective onshore gas basin in the Northern Territory. The Framework was written to be generally applicable to a SREBA undertaken in any region of the NT, and recognises that a more detailed, region-specific Scope of Works is required for each baseline study before it commences.

OBJECTIVES

This Scope of Works describes how the greenhouse gas (GHG) baseline studies for the Beetaloo Sub-basin SREBA will be undertaken, consistent with the approach set out in the SREBA Framework. The objective of the GHG studies is to provide pre-development baseline data to inform resource management, regional and project level assessment, effective regulation and monitoring associated with the development of an onshore gas industry. The studies will provide baseline information to enable the assessment of regional and cumulative effects of onshore gas development across the region.

This Scope of Works describes and defines the requirements for the GHG studies to establish the baseline for the Beetaloo Sub-basin, establish reference sites and design a program for ongoing monitoring to address the requirements described in the Final Report and Framework.

BASELINE REQUIREMENTS

Within the SREBA Framework, the Guidance Note for Greenhouse Gas studies described the baseline requirement as:

- assess the ambient methane concentrations across the region (including natural and anthropogenic sources)
- develop a basin conceptual model to identify areas of higher risk of geogenic emissions
- identify all of the potential methane sources contributing to the observed methane levels
- locate these sources
- determine the emission rates of each source
- examine any seasonal or annual variation
- identify indicators and methods that will be relevant for an ongoing monitoring program.

SPATIAL BOUNDARIES

The project will be conducted within the Beetaloo Sub-basin as defined by the map shown in Figure 1.

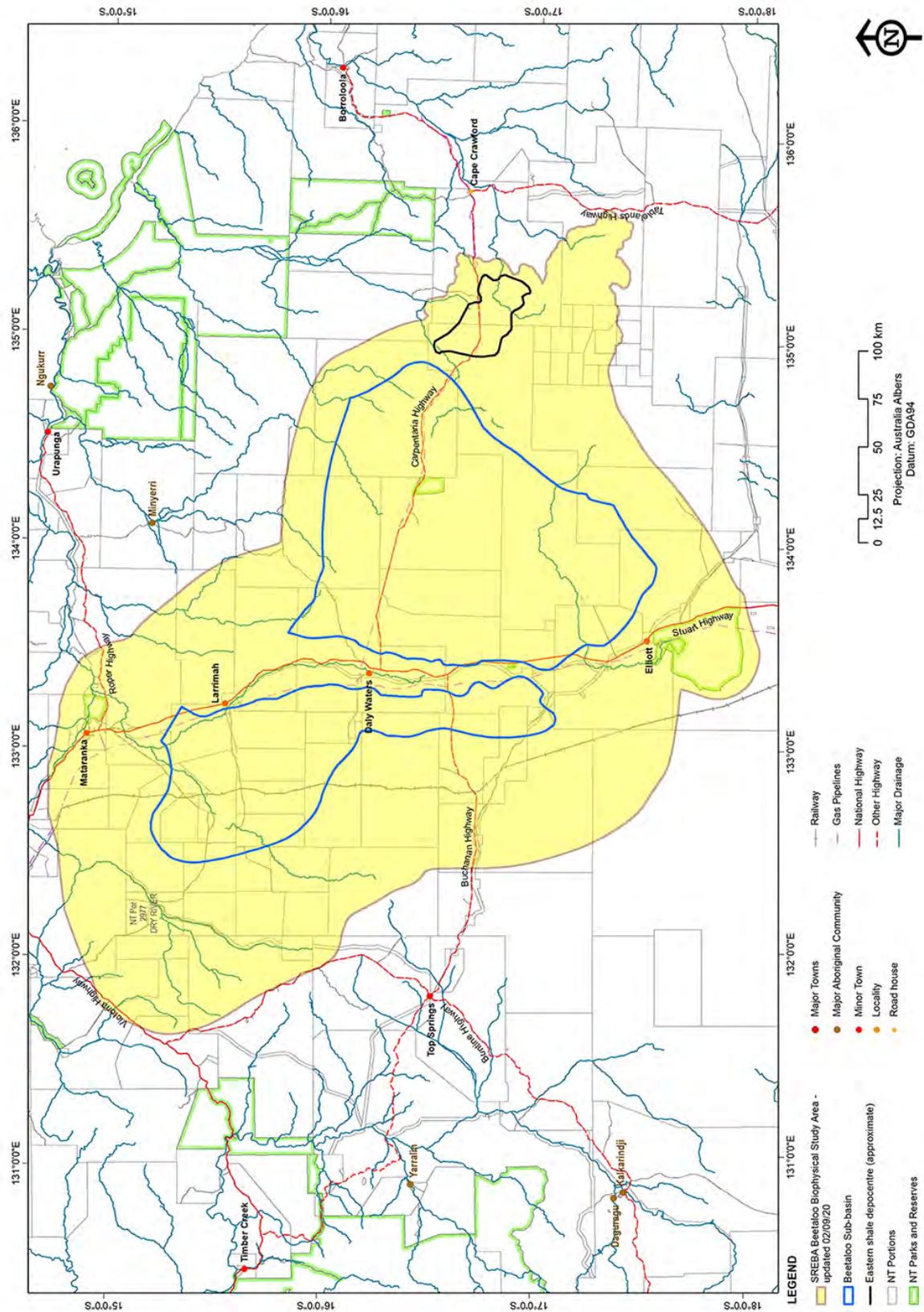


Figure 1: Map of the Beetaloo Sub-basin

METHODS

The proposed approach consists of three parts, which together cover the different points of the baseline requirements identified above.

Baseline mobile surveys

Mobile survey methods are one of the most widely used, reliable and well-developed techniques for undertaking baseline measurements of landscape CH₄ concentrations and fluxes and have been used in Australia, the United States and United Kingdom (Ong *et al.*, 2017; LTE, 2007; Phillips *et al.*, 2013; Zazzeri *et al.*, 2015). Over time, deployment of mobile surveys allows for accurate monitoring of CH₄ emission concentrations and fluxes under conditions that preclude immediate deployment of in situ monitoring stations. These surveys will be the dominant method used to collect baseline methane and other relevant GHG concentrations across the Beetaloo Sub-basin. Together with the initial baseline surveys conducted in 2018 as part of a GISERA project (Ong *et al.* 2019), these baseline mobile surveys will form a strong foundation for points 1-6 identified in section 3.

Three surveys covering the dry, fire and wet period will be conducted during 2021 and 2022, in order to understand seasonal variation. The surveys will be conducted along roads and accessible tracks with GHG analysers deployed from a 4WD. Where possible, abandoned and suspended wells, and water bores will be visited during the surveys to collect data that will assist in identifying and locating potential emission sources. Where potential emission sources are located, tracer measurements based on the method identified in the Guidance Notes for GHG studies will be used to quantify the emission rates.

Identification of geological seeps and reference sites

Areas of potential geological seeps will be identified and ranked during the first stage of this project. In the second phase, visits to the sites which are ranked as high potential will be conducted, most likely on foot. A portable methane/ethane analyser will be the primary measurement tool. If elevated values are detected, CSIRO researchers will deploy an autonomous monitoring station (AEMS) at the site, collecting methane, ethane, and meteorological data continuously for extended periods. CSIRO will develop the system, including selecting a set instrumentation, developing the systems, integrating with existing infrastructure, and a protocol for operating and maintaining the system. As the AEMS is a mobile system, where more than one potential geological seeps are identified, CSIRO will work with the SREBA management team to plan multiple field deployments.

Reference sites representing undisturbed areas with no potential disturbance or influences in the future will be identified in collaboration with the NT SREBA team and other researchers/stakeholders in the NT to evaluate the potential for extension of existing environmental monitoring networks and develop a shortlist of potential reference monitoring sites which may be suitable for extension or deployment of another AEMS at the site.

Collation of information produced by NT national programs and researchers

Information from NAFI and relevant NT researchers will be collated and the existing estimation of GHG emissions based on optical remote sensing used to extend the emission estimation to the Beetaloo Sub-basin, noting that data currently may not exist for that area. If possible, a multi-temporal approach will be taken where all existing data to date will be evaluated to provide a strong background for historical temporal variability.

The estimation of emissions from termites will be sourced from research results from Charles Darwin University researchers and the emissions from cattle calculated based on current models' emission rates and up to date herd numbers from the Cattlemen Association and/or local landholders.

DELIVERABLES AND REPORTING

The deliverables for this project are:

- Maps of the baseline methane concentration across the Beetaloo Sub-basin for the dry, fire and wet seasons. This will also take into consideration the data collected in 2018-19;
- Inventories of the sources of emissions, including estimations of the emission rates where sources were found;
- Identification of a geological seep and reference site to deploy the AEMS providing continuous real-time methane concentration measurements, and the development and installation of instrumentation to provide real-time methane data. Where more than one site has been found for geological seeps, consideration will be given to moving the AEMS to the other sites. However, as long term monitoring may be required, the time available for this project may not be sufficient. In that scenario, a monitoring program would be planned and recommended as future work;
- A final report documenting the findings of the study, an inventory of the sources and a proposed monitoring program including protocols for undertaking mobile surveys and plan for ongoing maintenance of the monitoring network;
- Delivery of a workshop to stakeholders on results of the work conducted.

The data from the baseline mobile surveys consisting of methane concentrations and emission rates where sources were found and estimated emission rates will be provided to the DEPWS in a geographical information systems (GIS) format adhering to the recommendations of the Guidance Note for Greenhouse Gas studies. In addition, near-real-time concentration data will be made available via a website.

The final report will provide a comprehensive overview that identifies pre-development background levels of methane emissions, identify and explain any spatial or temporal variation across the region, and identify the variables likely to influence background levels in the future (vegetation growth, fire frequency and intensity, cattle stocking rates, vehicle traffic, number of bores, extent of gas-related infrastructure, etc.) as recommended by the Guidance Note for Greenhouse Gas studies.

Project timeframe & milestones

Milestone	Completion Date		
	Dry season survey	Fire season survey	Wet season survey
Completion of mobile survey and delivery of interpreted maps	30 June 2021	30 September 2021	30 January 2021
Field investigation of geological seeps	June/July 2021		
AEMS development, deployment and protocols development	Instrumentation purchased	Installation of AEMS at one geological site, protocol development	Installation of AEMS at one reference site
	30 April 2021	30 December 2021	30 March 2021
Estimation of emissions from fire, termite, final report	30 June 2022		
Delivery of stakeholders workshop	June 2022		

Data and information management

All data collated for this project and interpreted data from this project will be provided to the DEPWS in a GIS compatible format where they were provided with positional data. Where the data is provided without positional data, it will be collated in digital ASCII format. The data to be collated includes:

- Public geophysical and geological data
- Ranking of potential areas of geological seeps based on interpretation of geophysics and geology data
- Maps of methane concentrations along routes travelled during the three mobile surveys
- Emission rates of sources located and where methane emission rates were quantified

- Temporal methane and ethane concentration data collected from AEMS during the periods of deployment. These data will be provided via a website.

In general, all SREBA data will become open access, except where access is restricted according to criteria described in the SREBA Framework. For greenhouse gas data, this is likely to apply only in very limited cases where open access to locality data may identify culturally sensitive sites.

Data will be curated and organised under a data management plan developed in consultation with DEPWS. The data management plan should identify owners and data custodians for all datasets, and any data restrictions.

COMMUNICATION AND STAKEHOLDER ENGAGEMENT

The SREBA Engagement Manager is the focal point for all stakeholder engagement and communication for the program. The SREBA Engagement Manager will liaise with landholders and relevant Land Councils to obtain permissions for access. Research teams can then directly contact individual landholders to arrange access, and will be required to observe landholder protocols such as advance notice, vehicle hygiene requirements and site inductions. Research teams will be provided with a briefing pack that includes vehicle hygiene certification documents, SREBA key contact details, specific landholder requirements, SREBA Factsheets, and other relevant documentation.

The SREBA management team will liaise directly with the Aboriginal Areas Protection Authority (AAPA) to obtain clearances and certificates for field work, and field work teams will abide by the conditions of certificates or guidance provided by AAPA. Teams may also be required to provide information during community consultations, and work with local ranger groups and community members for data collection.

The SREBA stakeholder engagement plan outlines the strategies for engaging with key stakeholders. Researchers carrying out the greenhouse gas studies will be required to contribute to stakeholder engagement activities coordinated through the SREBA management team, including:

- Field reports with summary survey results sent to landholders upon completion of field work.
- Radio interviews and information sessions to inform the community about the studies, what will be done, how the information will be used and where people can find further information.
- Closed social media groups for interested parties to receive updates and briefings on progress, field visits summaries and alerts for upcoming activities.
- Presentation to the Beetaloo Regional Reference Group (BRRG) at the commencement of the studies to inform the group of the scope, scale and timing of the studies and to seek feedback.
- Progress report presentations to the BRRG to update the group and provide any preliminary results.
- Final results, findings, models and monitoring plans presented to the BRRG at the completion of the studies.
- Final results, findings, models and monitoring plans presented in scientific seminars.
- Results, finding and models and monitoring plans published on the DEPWS website and made publicly available in user-friendly formats.

Researchers carrying out the greenhouse gas studies will provide updates to the DEPWS SREBA management team on progress and issues on a regular basis.

PROJECT RISKS

Risks	Mitigation measures
Travel and access restrictions related to COVID-19	From the current travel advisory, the work to be conducted will fall under the essential work category, where exemption can be granted. CSIRO have procedures in place for such fieldwork to be undertaken unless the NT government deemed the area to be under lockdown, in which case, delays cannot be mitigated.
Contracting COVID-19 or other infections before or during fieldwork	<p>Test temperature before going to the field and daily while in the field.</p> <p>Undertake (optional) COVID-19 and/or influenza test 3 days before the trip. If a positive result, feeling unwell and/or have flu-like symptoms, cancel trip or substitute personnel.</p> <p>While travelling in the aircraft, ensure that mask is worn, ensure hygiene standards are adhered to throughout the trip.</p> <p>Where possible, maintain a 1.5 m separation.</p> <p>Take gloves, masks, hand sanitisers, spray disinfectants and disposable wipes to clean all high contact surfaces in the car before trips and between driver changes.</p> <p>Maximum of 2 per vehicle where possible.</p> <p>Stop work, self-isolate and seek medical aid immediately if feeling unwell with flu-like symptoms.</p>
Seasons starting late	Up to 1-2 months of delays due to late season onset have been planned.

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