



DRILLING AND TESTING
ENVIRONMENTAL MANAGEMENT PLAN
PEL 285

CS-EV-02-0004

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Confidential
Lucas Energy Pty Ltd
Level 8 / 160 Queen St
Melbourne VIC 3000
Ph 03 8615 7800
Fax 03 8615 7888

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1. INTRODUCTION

The Gloucester Basin coal seam gas project is located in New South Wales, approximately 100 km north of Newcastle (Figure 1). The project is a joint venture between Lucas Energy Pty Ltd (Lucas) and Molopo Australia Limited (Molopo) (together referred to as Lucas-Molopo).

The location of the PEL area is approximately centred on the township of Stratford, approximately 70 kilometres (km) north of Newcastle in New South Wales (NSW). The area extends approximately 60 km north to south and approximately 20 km east to west comprising some 18 graticular blocks and about 1,308 square kilometres (km²) (Figure 1). The area completely contains the Gloucester Geological Basin.

The project is a conventional coal seam gas project. The project involves petroleum exploration activities including drilling and production testing.

1.1 Scope

This Environmental Management Plan (EMP) applies to the drilling and production testing of coal seam gas wells and the restoration of any disturbed areas.

1.2 Purpose

The purpose of this EMP is to identify the project environmental issues, management roles, procedures and reporting methods to be used that relate to the drilling and production evaluation testing of coal seam methane wells and facilitate achievement of project environmental responsibilities.

1.3 Abbreviations

CSM – Coal Seam Methane

EMP – Environmental Management Plan

REF – Review of Environmental Factors

PEL – Petroleum Exploration Licence

OH&S – Occupational Health and Safety

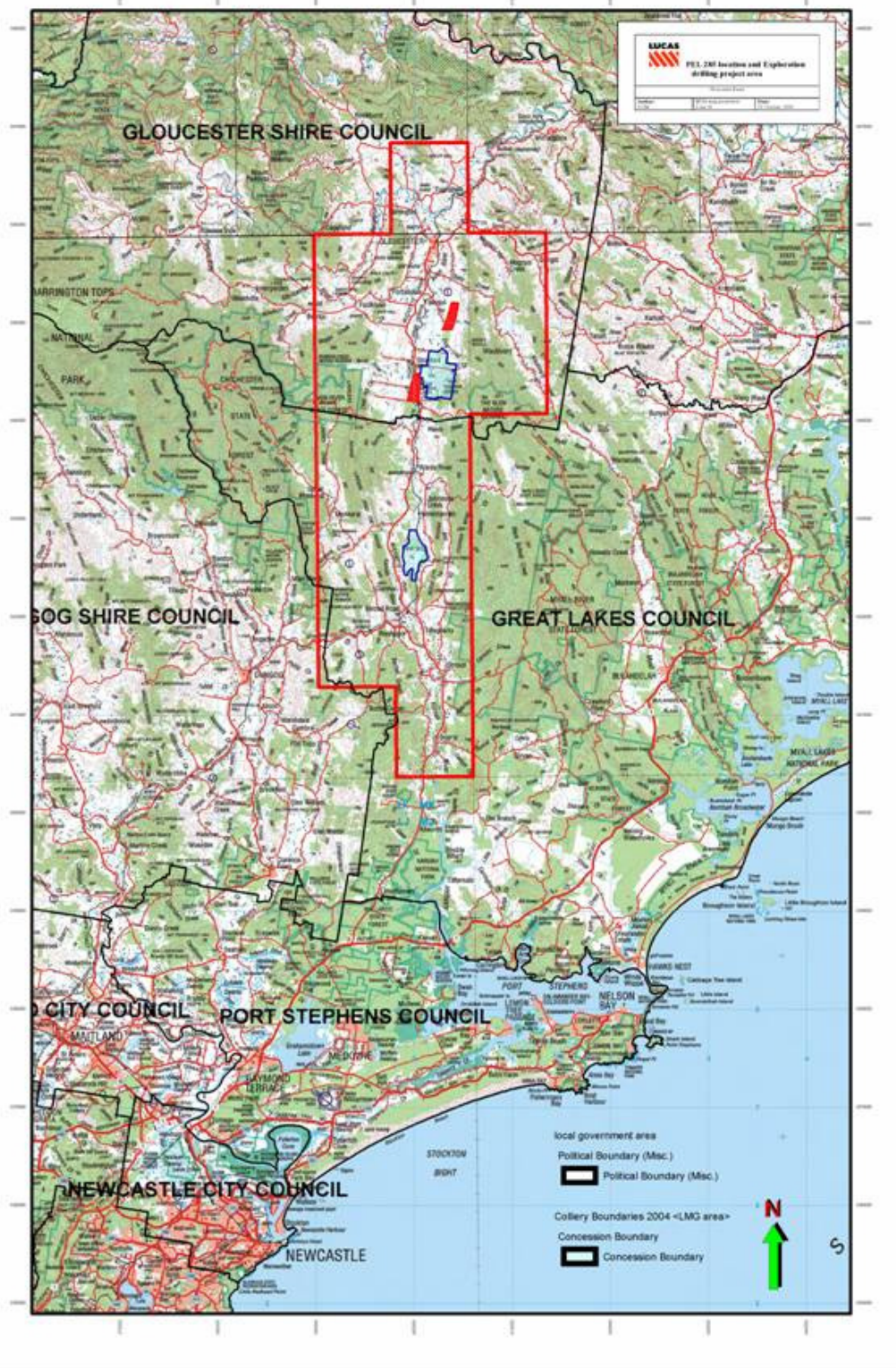


Figure 1: Project Location

2. PROJECT DETAILS

2.1 Aim of Project

The proposed drilling and production testing aims to further test coal seam methane characteristics and to define the potential resources of the area, with a view to the development of a production lease in the future.

2.2 Description of Proposed Activity

The proposed activity involves the drilling of multiple vertical coal seam methane appraisal holes, followed by downhole logging and testing operations.

The drilling and production testing activities will involve the temporary ground surface disturbance within fenced area of approximately 60 metres by 70 metres. To provide sufficient area for safe operation well locations have been selected within cleared grazing paddocks.

The drilling activity involves the establishment of a single, moderate size truck mounted drilling rig and ancillary equipment within the fenced well area.

Access to most of the works area is available from existing farm tracks. If required, some minor works may be undertaken to upgrade existing track or provide improved access. No clearing of vegetation for access tracks is required.

Production testing wells via flaring.

2.3 Location of Wells and Access

All borehole sites are located within PEL 285. Detailed location data including land ownership is available in the Review of Environmental Factors.

2.4 Environmental Acts, Guidelines and Licences

The works will be conducted in compliance with the *Petroleum (Onshore) Act 1991*, *Petroleum (Onshore) Regulations, 1997* and other Acts, Guidelines and Licences, as listed below:

- *Environmental Planning and Assessment Act, 1979*
 - *Schedule of Onshore Petroleum Exploration and Production Safety Requirements, August, 1992*
 - *Protection of Environmental Operations Act, 1997*
 - *National Parks and Wildlife Act, 1974*
 - *Threatened Species Conservation Act, 1995*
 - *Heritage Act, 1977*
 - *Environmental Protection and Biodiversity Conservation Act, 1999*
 - *NSW Radiation Control Act, 1990 and Regulations*
- APPEA (1996) Code of Environmental Practice

In accordance with the above, a number of documents have been created that address policy, objectives and response procedures relating to health, safety and environmental practices and impacts, as listed below:

- ▶ Lucas and Molopo Review of Environmental Factors - Prepared for this project for submission to the Minister for Mineral Resources for a determination under Part 5 of the *Environmental Planning and Assessment Act, 1979*.
- ▶ Lucas and Molopo Safety Management Plan for Coal seam Methane Production Evaluation in NSW - Sets out corporate policy pertaining to occupational health and safety aspects of operations in the exploration for coal seam methane in NSW.
- ▶ Lucas and Molopo Manual of Emergency Response Procedures - A site specific guide to action in the event of an emergency situation occurring at the drill site.
- ▶ Lucas Occupational Health and Safety Management System - Sets out corporate policy pertaining to all works conducted or managed by Molopo Australia, as the Project Manager.
- ▶ Lucas Environmental Policy - Sets out corporate policy pertaining to all works conducted as the Project Manager.
- ▶ Lucas Health and Safety Rules - Drilling Sites - Site safety document used in Site Inductions of staff, contractors and visitors.

2.5 Site Inductions

All persons visiting the site will undergo induction to explain site environmental requirements in accordance with the EMP.

2.6 Project Team Structure

The project team structure is shown in Figure 2.

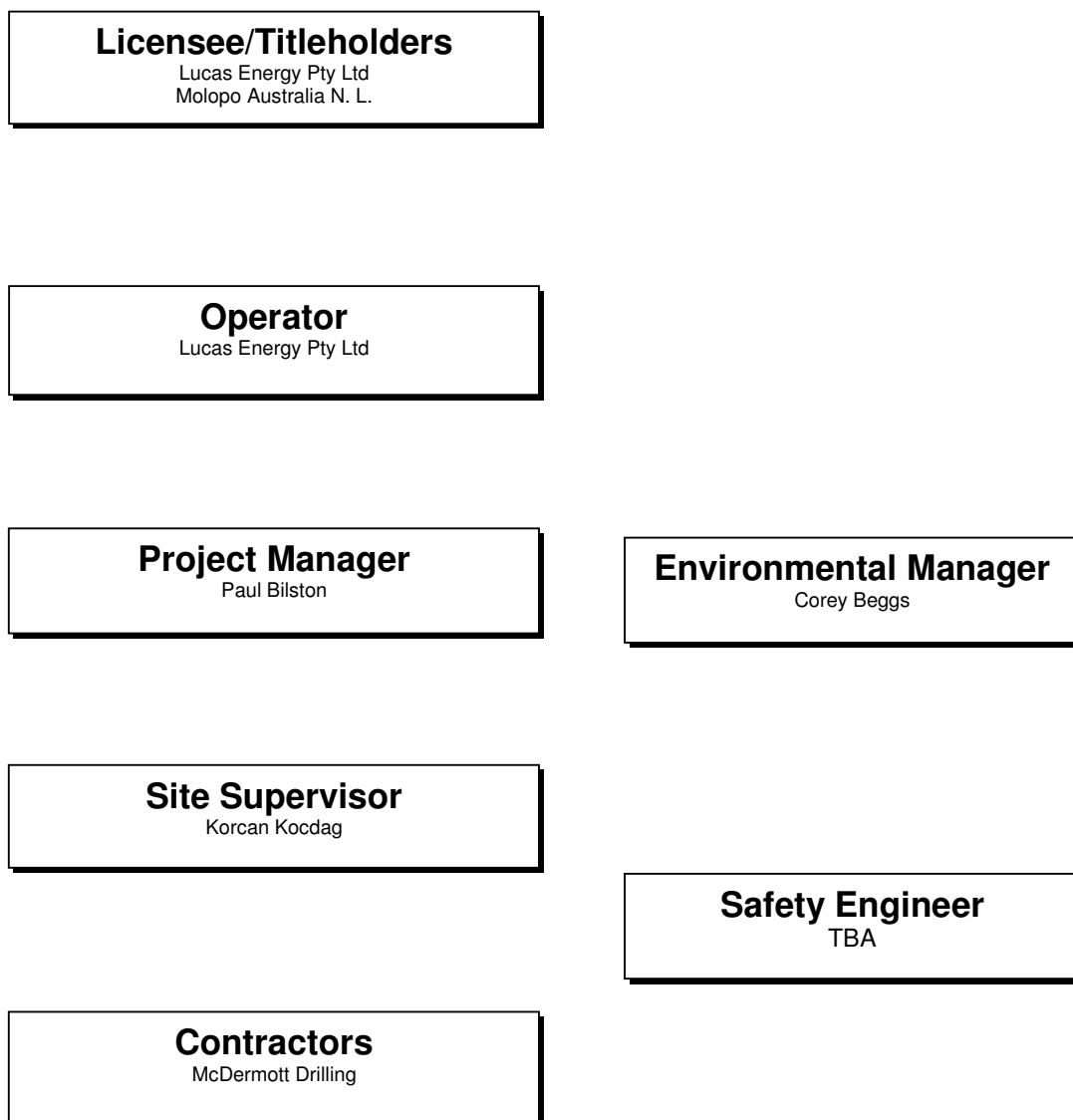


Figure 2: Project Team Structure

2.7 Procedures, Forms and Reporting

Lucas will undertake inspection of the drilling and storage pond sites and equipment to ensure that the environmental performance of Joint Venture and its contractors is satisfactory. These checks and relevant observations will be recorded in accordance with the AJ LUCAS GROUP Limited OH&S Management System (Document CO_HS_201) and Environmental Management System (Document CO_EV_201).

Site inductions will be recorded on the Health and Safety Induction Attendance Sheet – Drilling Sites. All inductees will be required to sign a Site Safety form indicating they have received instruction and understand the requirements of the Site Health and Safety Rules and agree to abide by them.

Drill site rehabilitation will be recorded on the CSM Drill Site Rehabilitation Audit Checklist.

When errors and deficiencies, either actual or potential are considered to have an adverse effect on the quality of test results, affect the safety of personnel, or impact on the environment, the person detecting the problem is required to initiate an Adverse Condition Report (ACR).

All complaints or occurrences of non-compliance to the environmental practices stated in the EMP are to be reported to the active Site Supervisor/s, as listed above in Figure 2.

3. ENVIRONMENTAL MANAGEMENT

Table 1 sets out the management processes to be implemented to control the potential impacts arising from the proposed activities.

Table1 Potential Environmental Impacts And Management

Aspects	Potential Impact	Management Process
Soils Site clearing and earthworks	Soil erosion and sedimentation	<p>Erosion and Sediment Control Plan</p> <ul style="list-style-type: none"> Clearly delineate disturbance areas to minimise the disturbance area and erosion and sediment migration potential. Construct table drains upslope of disturbance areas where necessary. Where possible retain grassed areas downslope to reduce overland flow velocities. Inspect the performance of all erosion and sediment controls (after rainfall events). Maintain and/or improve sediment or erosion controls where inspection indicates the need. <p>General Measures</p> <ul style="list-style-type: none"> Stockpile stripped topsoil and stabilise. Divert stormwater around all stockpiles. Rehabilitate site after completion of works. Seed topsoil with appropriate seed mix if required.
Surface Waters Management of drilling fluids	Adverse impact on local water quality and associated ecosystems	<ul style="list-style-type: none"> Store drilling fluids in sumps or storage tanks. Line sumps and/or use tanks to store drilling fluids. Always provide a spare sump to contain overflow from main sumps in event of heavy rain or flow from bore. If necessary, dispose of drilling fluids at appropriate off-site facilities. No discharge of drilling fluids to waterways. Prohibit use of petroleum based drilling fluids or additives in the drilling and testing of hole.
Management of production water	Adverse impact on local water quality and associated ecosystems	<p>Production Water Management Plan</p> <ul style="list-style-type: none"> All production water to be pumped to the turkeys nest ponds. Turkeys nest ponds to be lined with a geo-membrane liner to minimise seepage. Maintain an operational freeboard of 450mm to provide containment of a 1 in 100 year 72 hour rainfall event. Regularly inspect turkeys nest ponds to confirm an operational freeboard of 450mm is available. Immediately cease pumping to the pond if the operational freeboard level is reached. Disposal of contained waters will be via the controlled discharge to land via irrigation, water quality testing will carried out prior to discharge.

Aspects	Potential Impact	Management Process
Handling of fuel, oil drilling fluids and control of spills and leakage.	Contamination of soils, water or ecosystems	<ul style="list-style-type: none"> • Maintain inventory of all fuels and chemicals stored on-site. • Maintain MSDS for all fuels and/or chemicals. • Minimise storage of fuels and oil on-site. • Maintain spill control kits on-site. • Train all staff including contractors in spill response and cleanup procedures. • All contaminated material to be removed to a licensed disposal facility.
Groundwater	Potential adverse impacts on groundwater quality or levels.	<ul style="list-style-type: none"> • Solid case well intersections with alluvial aquifers. • Cement grout wells at completion of works. • Use fresh water trucked to site for initial drilling fluids and hydraulic fracture stimulation. • Monitor production water quality monthly during the first 3 months of testwork. • Monitor groundwater levels and quality at the nearest water supply bore (dependent on landholder agreement and suitable bore configuration and usage).
Flora, fauna and weed management	<p>Harm to existing native vegetation or wildlife</p> <p>Introduction and spreading of noxious weeds through vehicle traffic movements</p>	<ul style="list-style-type: none"> • No clearance of remnant vegetation areas. • Restrict vehicle speeds on property tracks to less than 45 kph in day and night. • No discharge of drilling fluids to waterways or land. • Erect temporary stock fence around drill sites and turkeys nest ponds. • Clean equipment prior to delivery to site. • Regular weed control inspections. • Clean equipment prior to leaving site.
Aboriginal heritage	Harm to historical or Aboriginal artefacts or objects	<ul style="list-style-type: none"> • If Aboriginal relic(s) are found, cease works in vicinity of relic(s) and advise National Parks and Wildlife Service personnel and the Local Aboriginal Land Council. • Obtain appropriate licensing for temporary removal of the artefact prior to removal. • If historical relics (>50 years old) are identified, notify the NSW Heritage Office and cease works in the vicinity of the relic.
Noise	Excess noise from drilling and production equipment affects residences	<ul style="list-style-type: none"> • Consultation to be undertaken with potentially affected residents prior to drilling commencing. • Drilling operations to be conducted for only 2-5 weeks in total, the majority of these works restricted to daytime only. • Additional noise controls on drilling rigs can be applied, if required.
Waste disposal Recycle & waste management	<p>Waste inappropriately disposed</p> <p>Improved environmental aspect in support of sustainability</p>	<ul style="list-style-type: none"> • No waste or rubbish to be discarded at sites. • Covered rubbish bins to be utilised for domestic waste. • If necessary, dispose of drilling fluids and cuttings at appropriate facilities.

Aspects	Potential Impact	Management Process
	goals for waste minimisation.	<ul style="list-style-type: none"> • Portable toilet to be provided at site • All sites to be rehabilitated and cleaned up following works. • Sort waste on site for recycling. • Record products delivered on site and record product be removed from site.
Dust	Dust generated from disturbed areas and tracks affects surrounding area	<ul style="list-style-type: none"> • Limit vehicle speeds on property tracks to less than 45 kph during the day and night. • Minimise land disturbance areas. • Cover or stabilise any stockpiles. • Water dusty trafficked areas if required.
Bushfire	Damage to fauna, flora and equipment. Danger to staff.	<ul style="list-style-type: none"> • Ensure flare line pit are kept free of grass and build up of leaves. • Maintain fire control water pump and hoses on sites. • Do not light fires in or around sites. • If required, maintain fire break around sites, and slash grasses longer than 100 mm in firebreak and compound. • Minimise storage of fuel and oil on-site. • Liaise with the local officer of the Rural Fire Service.

4. RESTORATION

Under a formal access for exploration activities agreement currently in place with the landowner, the Joint Venture will fully restore land affected by the site works.

After completion of drilling and testing activities, the borehole will be securely capped with a valve arrangement and pressure gauge, to allow future access. The valving would be located in a cement cellar approximately 1 m deep and flush with the ground surface. Water remaining in the drilling sumps would be allowed to evaporate and the sumps backfilled. Remaining cuttings would be buried under 1m of soil. The surface of the drilling area would then be rehabilitated. Once the stage is reached where no further testing is required, the boreholes would be cement sealed to the satisfaction of the DPI and the landowner.

Specific rehabilitation practices shall include but not be limited to:

- ▶ All waste materials and equipment shall be removed from the area.
- ▶ All flagging and bunting installed for environmental or safety reasons shall be removed.
- ▶ Compacted areas shall be deep ripped or scarified for relief as required.
- ▶ Disturbed areas shall be graded to reinstate pre-existing surface contours and natural drainage patterns.
- ▶ Stockpiled topsoil and seed stock shall be re-spread across the work areas from which it was removed.
- ▶ Surface roughness shall be encouraged when re-spreading topsoil to assist water retention and seed trapping.
- ▶ Private roads and tracks used shall be returned to their pre-construction state, or to a condition agreed by the landholder.
- ▶ Any infrastructure disturbed during construction shall be restored to the landholder's satisfaction.

5. REFERENCE DOCUMENTS

Lucas reference documents relevant to this activity include:

- ▶ CO_QA_201 Quality Management System
- ▶ CO_HS_201 OH&S Management System
- ▶ CO_HS_307 Fire Fighting
- ▶ CO_EV_201 Environmental Management System
- ▶ CO_EV_202 Waste Minimisation and Disposal
- ▶ CO_EV_501 Daily Site Inspection Environmental Controls (develop site specific)
- ▶ CO_EV_502 Waste Management Checklist (develop site specific)
- ▶ CO_EV_513 Weed Control Check List
- ▶ CS-HS-02-0001 Safety Management Plan
- ▶ CS-HS-02-0002 Emergency Response Plan
- ▶ CS_HS_03-0001 H&S Rules Drill Site
- ▶ CS-HS-03-0002 H&S Rules Project
- ▶ CS-HS-04-0001 H&S Induction Attendance
- ▶ CS-HS-04-0002 Adverse Condition Report
- ▶ CS-HS-04-0003 Work Place Injury Record
- ▶ CS-HS-04-0004 Blow out Preventer Test Record
- ▶ CS-HS-05-0001 CSMD Site Rehabilitation Check List