

Mahalo North PL 1128

Environmental Management Plan (EMP)

COI Environmental Management Plan	MH-HSES-PLN-002.1	Rev: 0

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1 INTRODUCTION

This Environmental Management Plan (EMP) has been prepared to outline the environmental management requirements for the Mahalo North PL 1128, and how environmental authority (EA) obligations and requirements will be managed.

1.1 Legislative Framework

Environmental Protection and Biodiversity Conservation Act 1999 (Cth)

Petroleum and Gas (Production and Safety) Act 2004 (Qld)

Environmental Protection Act 1994 (Qld)

Environmental Offsets Act 2014 (Qld)

Nature Conservation Act 1992 (Qld)

Water Act 2000 (Qld)

Waste Reduction and Recycling Act 2011 (Qld)

Aboriginal Cultural Heritage Act 2003 (Qld)

Other State Approvals

2 PROJECT DESCRIPTION

The Project involves the construction, operation, decommissioning, and rehabilitation of a CSG activity, including the following infrastructure components ;

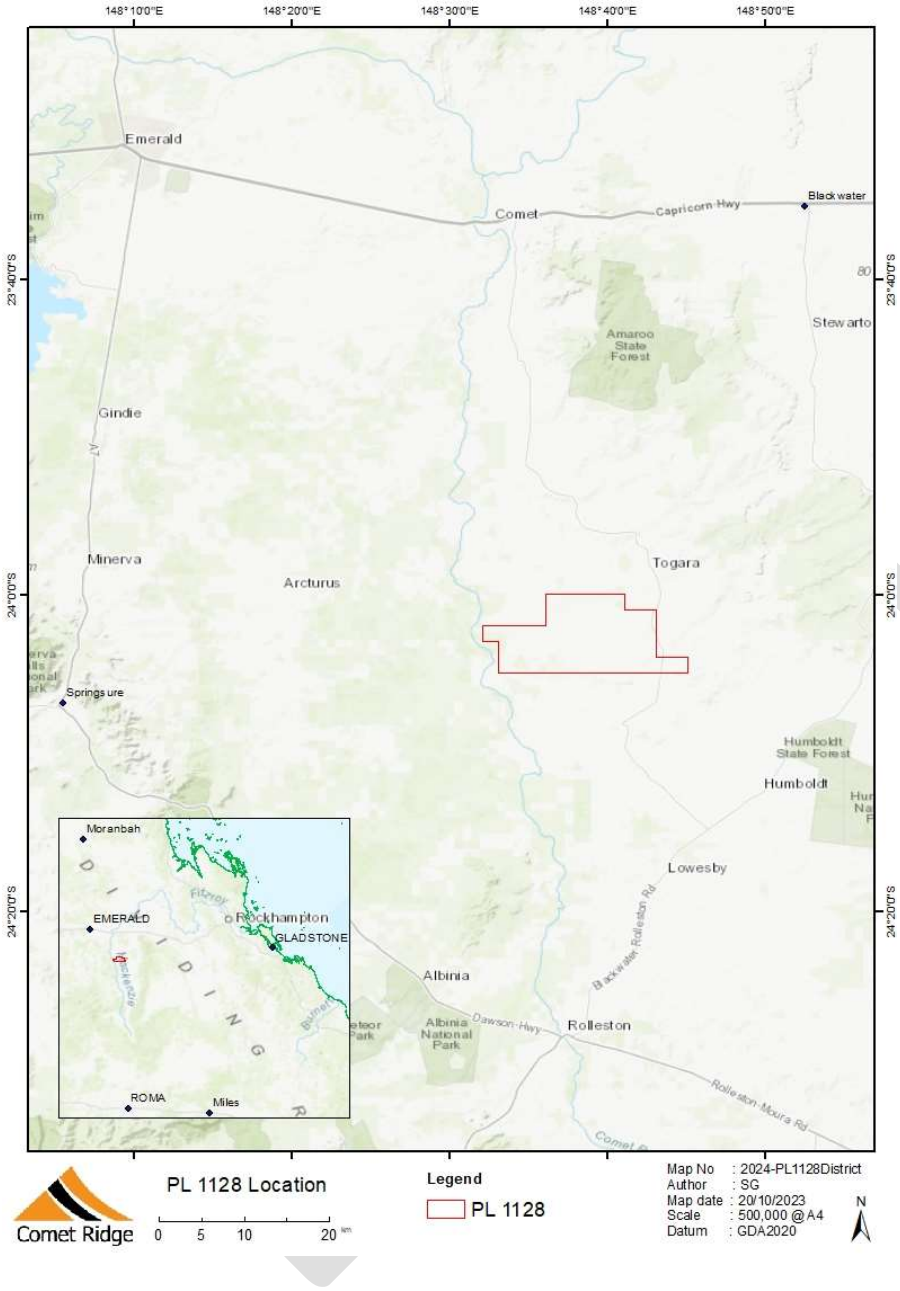
- 68 coal seam gas wells
- Gas and CSG water gathering pipelines
- Gas compression facility (GCF)
- New access tracks as required

3 ROLES AND RESPONSIBILITIES

Please refer to the Comet Ridge Mahalo Hub Emergency Response Plan.

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Figure 1 Location



4 DESCRIPTION OF PROJECT ACTIVITIES

4.1 Type of Activity

The activities to be undertaken on site are petroleum production and incidental activities including:

- Well drilling (both vertical and lateral)
- Geotechnical investigations;
- Environmental and Cultural heritage surveys;
- Vegetation clearing;
- Earth works;
- Operations of a gas compression facility
- Operations of a reverse osmosis facility and storage of CSG produced water and permeate and brine
- Ongoing monitoring

4.2 General environmental duty

Under Section 319 of the *Environmental Protection Act 1994* a person must not carry out any activity that causes or is likely to cause environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm. This is referred to as the general environmental duty.

The measures required to be taken must have regard to:

- the nature of the harm or potential harm; and
- the sensitivity of the receiving environment; and
- the current state of technical knowledge for the activity; and
- the likelihood of successful application of the different measures that might be taken; and
- the financial implications of the different measures as they would relate to the type of activity.

4.3 Communications Plan

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5 ENVIRONMENTAL INDUCTION AND TRAINING

A process for inducting new personnel, including contractors, onto the site will be implemented. The objective will be to ensure the entire workforce is aware of the environmental obligations of the project.

Management Plan 1 Induction and training plan

Induction and Training Plan	
Environmental Protection Objective	• Ensure all staff and contractors are aware of their environmental obligations and comply with all requirements
Performance Standards and Indicators	• All staff, contractors and visitors have undergone site induction and relevant training.
Control Strategies	• A site induction program will be developed that addresses the key site environmental requirements including locations of Category A, B and C environmentally sensitive areas. The induction program will be flexible and regularly updated to reflect changes in environmental requirements. • Additional training will be targeted to staff with specific responsibilities. • A training and induction register will be maintained and records kept for a minimum of five years.
Relevant EA conditions	• None
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6 INCIDENTS AND COMPLAINTS

COI has developed a management system for environmental incidents particularly those involving hazardous substances including fire, explosion, spillage, leakage or other escape into the environment. The management system is available as a separate document. The following table provides a summary of control measures for potential environmental incidents.

Management Plan 2 Environmental Incident Management Plan

Environmental Incident Management Procedures	
Environmental Protection Objective	• Minimise environmental harm from fire, explosion, spillage, leakage or other escape of harmful substances.
Performance Standards and Indicators	• The response to and reporting of environmental incidents is appropriate to the environmental risk of the incident. • An emergency response capability and suitable number of spill kits or suitably stocked area in a proximate container is maintained.

Control Strategies	• Prepare a Contingency Plan for Emergency Environmental Incidents which addresses the following:
	  ○ Definition of what constitutes an environmental emergency event.
	  ○ Identification of the types of environmental incidents that may occur
	  ○ Response procedures to be implemented to prevent or minimise the risk of environmental harm arising from incidents
	  ○ Response procedures to minimise the extent and duration of environmental harm caused by an incident
	  ○ The practices and procedures to be employed to restore the environment or mitigate any environmental harm caused
	  ○ Communication procedures and lines of communication within and beyond the Project to be employed in responding to incidents
	  ○ The resources to be used in response to an incident
	  ○ Procedures to investigate the cause of any incidents, including releases, and where necessary, the remedial actions to be implemented to reduce the likelihood of recurrence of similar events
	  ○ A receiving environment monitoring program, to be specifically implemented in the event of a release to waters/land to examine and assess environmental impacts
	  ○ The provision and availability of documented procedures to staff attending any incident to enable them to effectively respond
	  ○ Training of staff that will be called upon to respond to incidents
	  ○ Timely and accurate reporting of the circumstance and nature of incidents to the administering authority and any affected landholder or occupier
	• Procedures for accessing monitoring points during incidents.
	• Take immediate action to reduce any risk associated with unauthorised discharges to air, land and water.
	• Investigate the incident to determine the likely cause, record the outcome of the investigation (keep these records for the life of the Project) and take appropriate remedial actions.

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Environmental Incident Management Procedures	
	• Review the risk assessment required in the relevant State regulations and take appropriate actions to reduce risk. • Excavate or remove contaminated ground (spills up to five litres or less) in a sensitive area, or remedy through an approved process. • Report spills of any volume of contaminants to water to the administering authority. • Report releases as defined in the EA to the administering authority • Notify relevant landowners in the event of an unauthorised release likely to impact on landowner activities and/or safety. • Conduct soil, surface water and/or groundwater sampling and monitoring of the clean-up area if required. • Obtain inputs from consultants if required. • Notify the appropriate authorities in accordance with the Emergency Response Plan and Environmental Authority and Legislative requirements. • A complaints register and handling system will be maintained.
Relevant EA conditions	•

Enquiries/complaints will be dealt with in a responsive manner so that stakeholders feel their concerns are being seriously dealt with and not dismissed. This will assist in building a relationship of trust and reliability between the community and Project team. Complaints will be handled in accordance with the condition of the EA and the Complaints Register and Management Plan provided in Management Plan 3

Management Plan 3 Complaints register and management plan

Complaints Register and Management Plan	
Environmental Protection Objective	• Deal with enquiries and complaints in a responsive manner
Performance Standards and Indicators	• All complaints and responses recorded in the complaints register. • The response to and reporting of complaints is appropriate.
Control Strategies	• A central point of contact will be maintained for enquiries and complaints, to enable the content and distribution of information to the community to be managed and monitored. • Each complaint will be assessed for its validity and potential risk and investigated as soon as practicable. • Corrective action will be implemented where appropriate to address the cause of the complaint and to minimise reoccurrence of similar complaints. • The following details will be recorded in the complaints register for all complaints received: • Name, address and contact number for complainant • Time and date of complaint • Reasons for the complaint as stated by the complainant • Investigations undertaken in response to the complaint • Conclusions formed • Actions taken to resolve complaint

Complaints Register and Management Plan	
	• Any abatement measures implemented to mitigate the cause of the complaint • Name and contact details of person responsible for resolving the complaint • Records will be kept for a minimum of five years. • The administering authority will be notified of valid complaints and any actions proposed or undertaken in relation to the complaint. • Any monitoring or actions requested by the administering authority will be undertaken.
Relevant EA conditions	•

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7 MONITORING AND REPORTING

Monitoring and reporting are key measures to demonstrate compliance with the EA. The EA stipulates certain standards and methodologies to be used, and when monitoring and sampling is to be undertaken by a suitably qualified person.

Management Plan 4 Monitoring and reporting

Monitoring and Reporting	
Environmental Protection Objective	• Compliance with the requirements of the EA
Performance Standards and Indicators	• Meet all reporting and record keeping requirements • Monitoring standards will be compliant

Control Strategies	• All monitoring required will be compliant with the standards set in the EA
	• If no specific standards are set, then appropriate Australian Standards, Codes or industry best practice guidelines will be followed
	• Monitoring systems and processes shall be put in place by a suitably qualified person to ensure compliance with the EA
	• All laboratory analyses and tests will be undertaken by a laboratory that has appropriate NATA accreditation
	• Where there is no NATA accredited laboratory, duplicate samples will be sent to at least 2 separate laboratories for independent testing
	• Sampling and monitoring results will be kept in readily accessible files, labelled appropriately, and collated if necessary
	• These records will be made available to the administering authority as required or in annual reports
	• A certification is required by a suitably qualified person for each plan, procedure, program and report required to be developed under the EA
	  ○ That relevant material and published guidelines have been considered in the written document
	  ○ The content of the written document is accurate and true
	  ○ The document meets the requirements of the relevant conditions of the EA
	• All documents will be kept for 5 years

Relevant EA conditions	•

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8 AIR

The project area itself is in a rural area; however the area is more broadly located between a number of operating coal mines, including Blackwater Mine, Cook Colliery, Curragh Mine, and Jellinbah Mine to the north; Minerva Mine to the west; and Rolleston Coal Mine to the south. These mines could be anticipated to affect the air quality due to coal dust particles, depending on the prevailing wind. Other than coal particulates the majority of the existing sources of emissions would be derived from:

- Products of combustion from fuel burning vehicles and equipment;
- Smoke from low-temperature scrub and agricultural burning;
- Wind erosion;
- Mining and extractive industry;
- Vehicle movements across dirt roads; and
- Livestock movements.

8.1 Proposed environmental protection commitments, objectives and control strategies

The Air Quality Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on air quality and other air environmental values relevant to the project area.

Management Plan 5 Air Quality Management Plan

Air Quality Management Plan	
Environmental Protection Objective	• To avoid impacts on human health and amenity arising from particulate emissions • To minimise dust emissions beyond 100m of construction activities • To minimise gas emissions from flaring, venting or fugitive emissions
Performance Standards and Indicators	• Consultation with potentially affected landowners/occupiers (sensitive receptors) • Limited or no air quality complaints from sensitive receptors
Control Strategies	• Where possible, soil stock piles will be placed in areas protected from the wind and away from public places. Stockpiles will be aligned with prevailing winds to minimise cross sectional area exposed to the prevailing wind direction. Spoil stockpiles will be lightly compacted after placement • Existing vegetation will be retained where possible or cleared areas and stockpiles re-vegetated with fast growing species for stabilisation • Construction traffic will be controlled by using specific routes for haulage and access. Vehicle speeds on unsealed roads will be limited to 50km/hr, or less if significant dust plumes occur • All trucks hauling dirt, sand, soil or other loose materials to and from project sites will be covered • All construction vehicles, mobile plant and machinery will be maintained and operated in accordance with the manufacturers' specification to minimise exhaust emissions • Water spraying will be undertaken for dust suppression on unsealed roads

Air Quality Management Plan	
	• Any complaints in relation to dust emissions will be recorded, and if any variation to the control strategies is indicated, this will be implemented. • During drilling and well operations, flaring and venting will be minimised in accordance with section 72 of the P&G Act • Regular testing for well-head leaks in accordance with the Queensland Government's *Code of practice for coal seam gas well head emissions detection and reporting*.
Relevant EA conditions	•

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9 NOISE AND VIBRATION

The predominant land use within the Project area is primarily rural in nature, and accordingly, background noise levels are low. Major noise sources include existing mining activities, cattle truck movements and helicopter mustering activities .

9.1 Sensitive Receptors

Sensitive receptors have been identified on the Meroo Downs property (the occupiers homestead) and on Struan Station (the ringers quarters and the owners homestead).

9.2 Proposed environmental protection commitments, objectives and control strategies

The Noise and Vibration Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts of noise and vibration within the project area.

Management Plan 6 Noise and Vibration Management Plan

Noise and Vibration Management Plan	
Environmental Protection Objective	• Noise from activities associated with construction and operation will not cause an environmental nuisance at a sensitive receptor • Minimise noise impacts to fauna where possible.
Performance Standards and Indicators	• Consultation with potentially affected landowners/occupiers (sensitive receptors), especially if atypical noise events are anticipated • Limited or no noise related complaints from sensitive receptors • Ensure condition limits in the EA are not exceeded in the event of a complaint
Control Strategies	• consider potential for noise nuisance when planning activities; • avoid undertaking noisy activities near sensitive receptors where possible; • notify landholders of construction works in advance of commencement of works. Provide information on likely timing and duration of works and contact details in the event of questions or complaints • notify landholders of any proposed blasting activities; • notify landholders of any proposed night time construction works; • liaise with landholder about how to minimise potential impacts and implement “alternative arrangements” if necessary. • Review noise control measures if activities move into proximity of sensitive receptors • Apply noise mitigation measures to permanent noise sources where necessary (e.g. in the event that valid noise complaints are received)
Relevant EA conditions	•

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10 LAND

10.1 Description of Environmental Values

Refer to the Epic Environmental consultants reports, Ecological Assessment Report (2023) and Aquatic values assessment (2023) for details on the environmental values in the project area. These reports are available on the Comet River website and company servers.

10.2 Proposed environmental protection commitments, objectives and control strategies

The control strategies in the Management Plans below will combine to protect land values identified in the above mentioned reports.

The Vegetation Clearing Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on terrestrial flora values, fauna habitat values and sensitive environmental areas and communities.

Management Plan 7 Vegetation Clearing Management Plan

Vegetation Clearing Management Plan	
Environmental Protection Objective	• Minimise vegetation clearing to the extent practicable for the safe operation of petroleum activities
Performance Standards and Indicators	• No unauthorised clearing of native vegetation • No unauthorised disturbance to flora species or habitats of flora species listed as endangered, vulnerable or rare under State or Commonwealth legislation

Control Strategies	• Assess sites for vegetation prior to undertaking activities, by a suitably qualified and experienced person
	• Where site assessment results in identification of protected species or regional ecosystems, in order of preference:
	  ○ adjust location to avoid the protected species or ecosystem
	  ○ adjust the activity to prevent impact (e.g. change design or layout)
	  ○ if there is no viable alternative, seek additional authorisation where that is appropriate, which may include offset conditions
	• Document activities

Relevant EA conditions	•

The Fauna and Pest Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise direct and indirect impacts on terrestrial fauna values.

Management Plan 8 Fauna and Pest Management Plan

Fauna and Pest Management Plan	
Environmental Protection Objective	• Minimise impacts on significant fauna species as a result of exploration, development and decommissioning activities

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Fauna and Pest Management Plan	
Performance Standards and Indicators	• No unauthorised disturbance to fauna species or habitats of fauna species listed as endangered, vulnerable, rare or near threatened under State or Commonwealth legislation • No introduction or spread of introduced pest animals.

Control Strategies	• Pre-disturbance field surveys for fauna species
	• Appropriate fencing or cover of areas where fauna may be entrapped such as well infrastructure, dams or trenches
	• Regular checking of areas where fauna may be entrapped
	• A fauna spotter/catcher will be consulted if any fauna need to be removed from an entrapment
	• Liaise with local wildlife carers or veterinarians for appropriate treatment of injured animals
	• Pest animals will be controlled by:
	  ○ Limiting the introduction of pest animals to the area
	  ○ Prompt action to control any introduced species of pest animals
	  ○ No domestic animals belonging to project personnel or subcontractors will be permitted on site
	  ○ Covering and securing scrap kitchen waste so that it does not attract pests

Relevant EA conditions	•

The Weed Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts from weeds on terrestrial flora values and land use.

Management Plan 9 Weed Management Plan

Weed Management Plan	
Environmental Protection Objective	• Prevent or minimise the introduction or spread of pests through movement of people, vehicles, machinery or soil and vegetation disturbance
Performance Standards and Indicators	• No introduction of new weed species on the project area as a result of the petroleum activities • No increase on the project area in abundance or distribution of weed species as a result of the petroleum activities
Control Strategies	• Identify and record areas currently subject to weed infestations • Control and manage pest infestations and outbreaks resulting from petroleum activities in consultation with the relevant landowner • Weed washdown procedures will be implemented where necessary • Periodic monitoring of petroleum sites and access tracks for weeds • Include weed awareness and procedures in induction and tool box talks for relevant personnel • If required, a vehicle and plant movement protocol will be established • If a new weed infestation is reported or found, take appropriate action to contain and eradicate. Evaluate weed control procedures and amend if necessary.
Relevant EA conditions	•

The Soil and Erosion Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on land and soil quality values.

Management Plan 10 Soil and Erosion Management Plan

Soil and Erosion Management Plan	
Environmental Protection Objective	• Minimise soil erosion and sedimentation that may result from exploration, development, or decommissioning activities.
Performance Standards and Indicators	• No failure of erosion and sediment control measures that result in the release of sediment • No degradation of topsoil quality as a result of project activities
Control Strategies	• Avoid works during wet season or heavy erosive rainfall as much as practicable • Undertake targeted investigations to identify areas with reactive/erosive/dispersive soils. Have appropriate strategies for particular soil types if applicable • Minimise vegetation clearing and leave root stock in-situ where practicable to minimise potential for soil erosion • Reuse stripped topsoil in areas to be rehabilitated with similar topsoil characteristics if possible. If topsoil cannot be effectively reused immediately, stockpile ensuring the height of the stockpile is no more than 2m. Long-term stockpiles will be re-vegetated with appropriate cover crops to minimise loss of topsoil • Topsoils and subsoils will not be mixed. Replace subsoils at depth and cover with topsoil • Where practicable, mulch cleared vegetation and spread as protective layer over exposed soil • Stabilise problem area that have the potential for erosion or soil movement with surface stabilisers, crushed rock or scour protection as necessary • Slow the overland flow of water and floodwaters by installing frequent contour banks, whoa boys or similar in appropriate areas • Direct discharges to multiple locations to decrease volumes. Discharges will be stable drainage lines. Implement engineering controls in drainage line where necessary • Any erosion and sediment control devices installed will remain in place until the relevant area is stabilised by rehabilitation • Re-establish the bed and banks profile of any waterways or creeks disturbed by petroleum activities • Reference to the guidelines *Best Practice Erosion and Sediment Control* (International Erosion Association Australia, 2008 or later versions)
Relevant EA conditions	•

A Land Use Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on land use, landholders and other land tenure holders.

Management Plan 11 Land Use Management Plan

Land Use Management Plan	
Environmental Protection Objective	• Minimise impacts on existing land uses and surrounding landholders/tenure holders as a result of exploration, development, production and decommissioning activities • Minimise disruption to infrastructure; • Avoid accidental damage to existing infrastructure and services • Avoid environmental harm and reduced soil productivity arising from the release of sediments, salinisation of soil, disturbance of contaminated soils and contamination of soils
Performance Standards and Indicators	• Consultation with potentially affected landowners and tenure holders • Limited or no complaints from landowners or tenure holders
Control Strategies	• Co-ordinate clearing and disturbance activities with landowners to minimise disruption to property operations • Use existing access roads where practicable • Flow lines will follow existing fence lines or roads where practicable to minimise disturbance to property activities • Consult with land/tenure holders on locations of field infrastructure to minimise impacts on property activities • Maintain a complaints register and handling system. • Conduct pre-clearing checks for potential soil contamination • If contaminated soil is identified, further investigate and in consultation with the landowner develop appropriate remediation strategies • Develop appropriate management and disposal methods for contaminated soils and other material • Dispose of significant quantities of contaminated soils to authorised facilities. Small quantities can be treated on-site where appropriate • Design fuel, oil and chemical storage areas in accordance with Australian Standards • Inspect and maintain all vehicles, plant and machinery to ensure they are not at risk of leaking or spilling contaminants • Ensure that appropriate handling and use of fuels, oils and chemicals is enforced on-site • Include handling procedures and clean up protocols in induction training and tool box talks where appropriate • Clean up spills promptly • Keep a spill kit on-site for each relevant infrastructure • Ensure that each well, low consequence dam and sewage treatment is adequately signposted for easy identification with a unique name or number
Relevant EA conditions	•

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11 WASTE

Waste generation for the construction and operation may include:

- vegetation;
- typical drilling wastes including packaging, surplus drilling materials such as timber, concrete, gravel, metals and plastics;
- returned drill cuttings and muds;
- surplus soil from earthworks;
- typical domestic waste generated from camps;
- sewage from camps;
- CSG water.

Where possible the waste will be reused, recycled or removed to a facility that can lawfully accept the waste under the EP Act.

All regulated waste will be removed from site and transported by a person who holds a current authority to transport such wastes to a facility that is lawfully able to accept the waste under the EP Act. Appropriate records must always be kept in accordance with Condition 59 of the EA and the relevant requirements of the *Environmental Protection Act 1994* and the *Environmental Protection (Waste Management) Regulation 2000*.

11.1 Potential Adverse or Beneficial Impacts

Potential impacts may include:

- release of hazardous waste to land or waters either through inappropriate waste disposal protocols or accidental release(s);
- inadequate waste management leading to inappropriate disposal, or inadequate re-use or recycling;
- compromised land use, ecosystems or well-being of people resulting from inappropriate waste disposal;
- beneficial re-use of coal seam gas water may result in improved conditions for agriculture etc. by providing an additional water source.

11.2 Proposed environmental protection commitments, objectives and control strategies

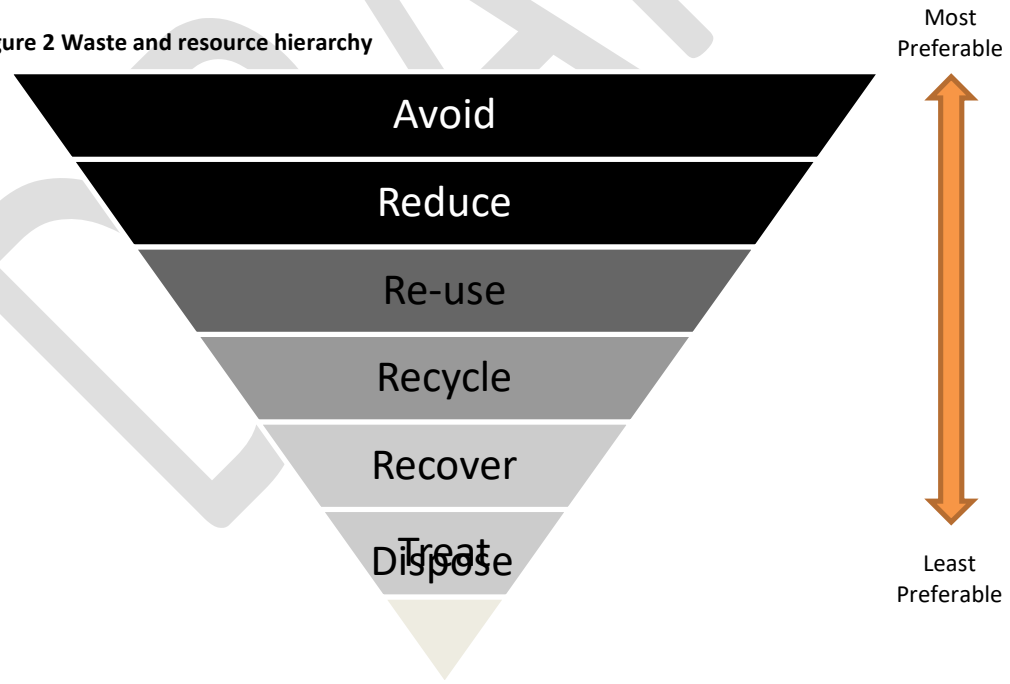
Objectives for waste management are based on the waste and resource management hierarchy outlined in section 9 of the *Waste Reduction and Recycling Act 2011* and presented in Figure 2.

Management Plan 12 deals with all general waste that may be generated by the petroleum activities, including drilling materials, packaging materials, green waste and sewage. Coal seam gas produced water, which is classified as a waste, is covered by Management Plan 13.

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Waste Management Plan	
Environmental Protection Objective	• Minimise waste generation to the extent practicable in accordance with the waste management hierarchy of avoid, re-use and recycle • Or dispose of waste in the most appropriate manner
Performance Standards and Indicators	• Prevent adverse environmental impacts from waste management • No inappropriate disposal of waste • No contamination of soil, air or water as a result of waste handling • Maximise the beneficial use of all waste, including coal seam gas water (refer to Management Plan 13)
Control Strategies	• Set up designated waste transfer areas i.e. regulated vs non-regulated; • Store recyclable waste separately from residual/non-recyclable waste; • Appropriately manage stockpile areas and storage areas; • Store all waste chemicals, fuels and oils at appropriately bunded areas in accordance with Australian Standards • Use pre-painted products to minimise use of paints and solvents; • Ensure waste is removed by an appropriate licensed contractor; • Ensure appropriate records are kept for regulated wastes; • Store used oils, oily rags, solvents, lubricants and fuel in covered and bunded areas; • Ensure drilling wastes are appropriately contained and disposed of
Relevant EA conditions	•

Figure 2 Waste and resource hierarchy



Management Plan 13 Coal Seam Gas Water Management Strategy

Coal Seam Gas Water Management Strategy	
Environmental Protection Objective	• Manage coal seam gas produced water in a way that optimises its beneficial use and minimises adverse impacts on environmental values • Contain coal seam gas produced water in appropriate structures until it can be re-used
Performance Standards and Indicators	• Beneficial use of coal seam gas produced water will be in accordance with the appropriate end of waste code • The initial consequence category of structures will be certified by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933) and the Guideline *Structures which are dams or levees constructed as part of environmentally relevant activities* (ESR/2016/1934)
Control Strategies	• Coal seam gas produced water will be contained in appropriately designed and constructed dams or tanks. [The EA only authorises low consequence category dams (i.e. not regulated structures, which are significant or high consequence category dams)] • Dams will be monitored regularly to ensure that the dam remains a low consequence category structure • Testing of coal seam gas produced water will occur prior to any beneficial use to establish that the water meets the criteria required for that use (e.g. stock and domestic) • For any beneficial use not covered by the General approvals, a specific BUA will be applied for
Relevant EA conditions	•

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12 SURFACE WATER

The project is contained within the Fitzroy River catchment area, and the Comet River sub-basin. The Fitzroy River drains to the sea at Rockhampton.

12.1 Description of Environmental Values

The *Environmental Protection Policy (Water) 2009* provides a framework for managing water, including identification values associated with water and setting of water quality objectives.

Environmental values identified for water in the project area are:

- Farm water supply;
- Stock watering and irrigation;
- Suitability for raw drinking water supply;
- Cultural and spiritual values.

12.2 Potential Adverse or Beneficial Impacts

The following potential impacts to surface water were identified for the construction and operating phases:

- increased sediment load in runoff and at stream crossings;
- water quality impacts associated with herbicides for weed control;
- water quality impacts from improper containment of chemicals, fuels, wastes and CSG water;
- stormwater discharge and flow redirection;
- impacts to natural flood flows.

12.3 Proposed environmental protection commitments, objectives and control strategies

A Surface Water Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on surface waters. Surface water encompasses watercourses, wetlands and springs; and overland flow as well as the management of stormwater runoff.

Management Plan 14 Surface Water Management Plan

Surface water Management Plan	
Environmental Protection Objective	• Undertake petroleum activities in a manner that has minimal impact on watercourses and wetlands • Undertake petroleum activities in a manner that minimises impact of stormwater runoff to surface water geomorphology, hydrology, quality and dependent ecosystems
Performance Standards and Indicators	• The natural flow of a watercourse has not been interfered with through placing fill, excavation, impoundment or diversion • Time of disturbance to a watercourse is as short as practicable • No unauthorised discharge to surface waters of contaminants, including through stormwater runoff

Control Strategies	• Infrastructure and activities will be designed to occur outside watercourses and drainage lines where practicable
	• Vegetation will not be cleared, nor fill placed in or within:
	  ○ 200m from any wetland, lake or spring; or
	  ○ 100m of the high bank of any other watercourse

Surface water Management Plan	
	• Activities for construction of pipelines or access tracks or any other linear infrastructure, will be undertaken in no or low flow conditions if necessary • Routine, regular and frequent visual monitoring will be undertaken while construction work is carried out in a watercourse • Petroleum activities that do occur in a watercourse, lake or spring will be designed and undertaken by a suitably qualified person • Refuelling of plant and equipment will occur at least 30m from a watercourse or other drainage feature • Hazardous and dangerous goods will be stored in bunded facilities located at least 100m from a watercourse or other drainage feature • Fuels and other flammable liquids will be stored in accordance with *AS 1940:2004 - The storage and handling of flammable and combustible liquids*. • Erosion and sediment controls will be installed where necessary at disturbed areas such as dam construction sites and drill pads. The erosion and sediment controls will be implemented and maintained in accordance with *Best Practice Erosion and Sediment Control* (International Erosion Association Australia, 2008 or later versions) • Where hardstand areas are installed, appropriate measures to reduce the possible effects of stormwater runoff will be implemented.
Relevant EA conditions	•

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13 GROUNDWATER

There are a number of requirements under the *Water Act 2000* designed to protect groundwater resources from the impacts of resource activities. A Baseline Assessment Plan is required to be submitted and approved prior to commencement of testing or production activities.

13.1 Description of Environmental Values

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* provides a framework for managing water, including identification values associated with water and setting of water quality objectives.

Environmental values identified for water in the project area are:

- Farm water supply;
- Stock watering and irrigation;
- Suitability for raw drinking water supply;
- Cultural and spiritual values.

13.2 Potential Adverse or Beneficial Impacts

The following potential impacts to groundwater were identified for the construction and operating phases:

- Potential drawdown of aquifers as a result of depressurisation activities for coal seam gas production;
- Potential loss of functional use of water bores as a result of that drawdown;
- Impact on aquifers as a result of drilling activities, including connectivity of gas producing horizons with water producing horizons;
- Contamination of aquifers due to poor drilling practises or improper isolation of zones by casing or cement;
- Potential impact on groundwater dependent ecosystems.

13.3 Proposed environmental protection commitments, objectives and control strategies

A Groundwater Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to minimise impacts on groundwater values as a result of petroleum activities. Note that the existing EA does not authorise well stimulation activities; so there are no control strategies outlined here.

Management Plan 15 covers groundwater that may be impacted by driling and production activities. Potential environmental impacts by coal seam gas produced water, after it has been brought to the surface are covered by Management Plan 13 under Waste.

Management Plan 15 Groundwater Management Plan

Groundwater Management Plan	
Environmental Protection Objective	• Manage petroleum activities in a manner that minimises impacts to groundwater quality and levels
Performance Standards and Indicators	• Well construction and operation in accordance with the relevant Codes • Oil-based or synthetic-based drilling muds will not be used • Drilling activities do not cause the connection of a target gas production horizon with other aquifers

Groundwater Management Plan	
	•
Control Strategies	• Drilling fluids will be water-based and biodegradable • During development of production wells, hydraulic isolation will be maintained between aquifers • Baseline assessment of any identified water bores in the area completed prior to testing • Undertake collation of historical water level data for bores in the area to establish natural seasonal variation in aquifer levels • Modelling of hydrological regime to determine connectivity or otherwise of coals seams with groundwater resources in the area
Relevant EA conditions	•

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14 CULTURAL HERITAGE

There is potential for activities undertaken in the project area to disturb unrecorded items of cultural heritage (CH). The management of accidental finds of cultural heritage items is therefore important, along with the Duty of Care requirements under the *Aboriginal Cultural Heritage Act 2003*.

The CH group for the project area are the Gaangalu Nations People (GNP). Prior to land disturbance, a CH ground survey will be conducted, utilising advisors from the GNP.

14.1 Proposed environmental protection commitments, objectives and control strategies

The Cultural Heritage Management Strategy is provided in the table below. This provides the environmental protection commitments and control strategies that will be implemented to minimise impacts to both unknown and undiscovered items and places of cultural heritage relevant to the project area.

Management Plan 16 Cultural Heritage Management Strategy

Cultural Heritage Management Strategy	
Environmental Protection Objective	• to avoid damage, destruction or degradation of cultural artefacts during the construction or operation; • to avoid impacts on other existing group rights seeking access to cultural artefacts and places
Performance Standards and Indicators	• compliance with the Duty of Care obligations under the *Aboriginal Cultural Heritage Act 2003*
Control Strategies	• identify and map all known cultural heritage sites • conduct cultural heritage surveys prior to commencing activities that could result in disturbance • catalogue any discovered artefacts • in the event of accidental finds, stop work to exercise Duty of Care • create buffer zones around fixed known cultural heritage locations (such as scar trees or sacred places) • where appropriate and in consultation with the CH advisors, log location details, and relocated artefacts for the duration of the project activities (such as isolated finds) • record results of any cultural heritage surveys in the register (if agreed by traditional owners)
Relevant EA conditions	• no specific conditions

15 REHABILITATION

Final land use will be determined by a number of factors including:

- Regulatory and legislative requirements current at the time of decommissioning and rehabilitation;
- Current best practice;
- Stakeholder views including those of landowners, particularly where continued use of infrastructure such as access roads, dams, water bores, fences and gates, may be required;
- Land use of surrounding areas and local community needs, for example land may be used for future community development rather than return to agricultural use;

- The nature of the receiving environment and the environmental values of the area.

The *Petroleum & Gas (Production & Safety) Act 2004* requires under section 560 that the tenure holder removes all equipment and infrastructure from the land prior to relinquishment of the tenure, unless the landowner agrees otherwise. A written agreement for any permanent infrastructure left to the landowner is required with the Final Rehabilitation Report required under the *Environmental Protection Act 1994*.

A Rehabilitation Management Plan is provided in the table below. This plan provides the environmental protection commitments and control strategies that will be implemented to maximise the effectiveness of rehabilitation activities.

Management Plan 17 Rehabilitation Management Plan

Rehabilitation Management Plan	
Environmental Protection Objective	• Final land form that is safe, non-polluting, stable and self-sustaining • Significantly disturbed land reinstated to pre-disturbance land use; except where otherwise agreed between the landholder, administrating authority and the tenure holder • Significantly disturbed land is rehabilitated to a stable landform requiring no on-going management greater than that required pre-disturbance
Performance Standards and Indicators	• Dams to be rehabilitated to become a stable landform similar to surrounding undisturbed areas OR with agreement maintained for use by the landowner. • Decommissioning of all infrastructure no longer required at cessation of activities. • No ongoing contamination of surface or groundwater. • Achieve stable landform with no subsidence or erosion gullies • Achieve 70% native ground cover species richness after rehabilitation compared to pre-disturbed or adjacent land use • Achieve greater than or equal to the total percent of ground cover compared to pre-disturbed or adjacent land use • Achieve less than or equal to the percent species of declared plant pests species compared to pre-disturbed or adjacent land use • Rehabilitated land to contain at least one regional ecosystem from the broad vegetation group in either the adjacent land or pre-disturbed land, with equal or higher biodiversity conservation value • Where the rehabilitated land was in an environmentally sensitive area, additionally achieve greater than or equal to 50% organic litter cover, and greater than or equal to 50% of total density of woody material • Where the rehabilitated land was in an environmentally sensitive area, additionally all predominant species in the ecologically dominant layer defining the pre-disturbance regional ecosystem are to be present
Control Strategies	• Progressive rehabilitation of disturbed areas as practicable, including reshaping significantly disturbed land to a stable profile and remediation of contaminated land. • Re-establish surface drainage lines. • Reinstate top layer of soil profile. • Continue weed management protocols (refer to Management Plan 9 Weed Management Plan). • Promote establishment of vegetation.

Rehabilitation Management Plan	
	• Regular maintenance of rehabilitated areas until performance standards are met. • Monitoring at least annually, or as appropriate, to measure progress of rehabilitation until performance standards are met. • Written agreements with landowners for rehabilitation works. • Written agreements with landowners for any infrastructure remaining on the property for their use. • Prepare Final Rehabilitation Report.
Relevant EA conditions	•

15.1 Proposed final land use

In the absence of specific landowner agreements, the proposed final land use will be consistent with the current pre-disturbed land use. Any land that is contaminated as a result of the petroleum activities will be remediated in accordance with accepted industry practice at the time and the relevant current regulatory and administrative requirements.

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Table 1 Rehabilitation objectives and criteria

Table 1 **Petroleum activity feature**	**Rehabilitation goal**	**Rehabilitation objectives**	**Indicators**	**Completion criteria**
Wells	1. safe	Site safe for humans and animals.	Reported accidents, incidents and injuries.	• Plugged with cement to isolate aquifers. • Surface facilities removed. • Re-contoured to condition consistent with surrounding area or proposed land use. • No reported accidents, incidents or injuries as a result of the petroleum activities.
	2. non-polluting	Stormwater runoff does not pollute nearby watercourses.	All equipment and chemicals from site are removed. No leakage.	• Monitoring meets background quality.
	3. stable	Stormwater runoff does not cause erosion. Surface contours re-established.	Subsidence. Erosion gully formation.	• No significant erosion events. • Landform re-established.
	4. self-sustaining	Land use returned to pre-disturbance use.	Foliage cover. Species diversity. Weed survey.	• Foliage cover established at 70% of the surrounding area. • No ongoing management required beyond that required for surrounding areas with similar land use. • Vegetation successfully self-propagating and reseeding. • Key species present. • No weed species introduced.
Flow lines	1. safe	Site safe for humans and animals.	Reported accidents, incidents and injuries.	• Lines isolated, drained, purged and vented. • Flushed and cleaned. • Capped and left in situ. • No reported accidents, incidents or injuries as a result of the petroleum activities.

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Table 1 **Petroleum activity feature**	**Rehabilitation goal**	**Rehabilitation objectives**	**Indicators**	**Completion criteria**
	2. non-polluting	Stormwater runoff does not pollute nearby watercourses.	Surface water quality.	• Monitoring meets background quality.
	3. stable	Stormwater runoff does not cause erosion. Surface contours re-established.	Subsidence. Erosion gully formation.	• No significant erosion events. • Landform re-established.
	4. self-sustaining	Land use returned to pre-disturbance use.	Foliage cover. Species diversity. Weed survey.	• Foliage cover established at 70% of the surrounding area. • No ongoing management required beyond that required for surrounding areas with similar land use. • Vegetation successfully self-propagating and reseeding. • Key species present. • No weed species introduced.
Access tracks	1. safe	Site safe for humans and animals.	Reported accidents, incidents and injuries.	• Fences removed. • Road closed. • Condition of land similar to surrounding landscape. • No reported accidents, incidents or injuries as a result of the petroleum activities.
	2. non-polluting	Stormwater runoff does not pollute nearby watercourses.	Surface water quality.	• Monitoring meets background quality.
	3. stable	Stormwater runoff does not cause erosion. Surface contours re-established.	Subsidence. Erosion gully formation.	• No significant erosion events. • Landform re-established.
	4. self-sustaining	Land use returned to pre-disturbance use OR Tracks maintained for use by landowner with agreement.	Foliage cover. Species diversity. Weed survey.	• Foliage cover established at 70% of the surrounding area. • No ongoing management required beyond that required for surrounding areas with similar land use. • Vegetation successfully self-propagating and reseeding. • Key species present.

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Table 1 **Petroleum activity feature**	**Rehabilitation goal**	**Rehabilitation objectives**	**Indicators**	**Completion criteria**
				• No weed species introduced.
Dams	1. safe	Site safe for humans and animals.	Reported accidents, incidents and injuries.	• Fences removed. • Condition of land similar to surrounding landscape. • No reported accidents, incidents or injuries as a result of the petroleum activities.
	2. non-polluting	No land contamination from contents of dam. Stormwater runoff does not pollute nearby watercourses.	Contaminated land assessment. Surface water quality.	• Salts removed and disposed at purpose built facility. • Above ground structures removed. • Monitoring of soils and water meets background quality.
	3. stable	Stormwater runoff does not cause erosion. Surface contours re-established.	Subsidence. Erosion gully formation.	• No subsidence or major erosion gullies. • Landform re-established.
	4. self-sustaining	Land use returned to pre-disturbance use.	Foliage cover. Species diversity. Weed survey.	• Foliage cover established at 70% of the surrounding area. No ongoing management required beyond that required for surrounding areas with similar land use. • Vegetation successfully self-propagating and reseeding. • Key species present. • No weed species introduced.

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APPENDIX 1 – ENVIRONMETAL AUTHORITY (EA) 100521948

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