Section 11 Coal Seam Gas Field Environmental Management Plan

11.1 Introduction

The purpose of this preliminary Environmental Management Plan (EMP) prepared for the GLNG Project is to propose environmental protection commitments to protect the environmental values that may be affected by the development of the project and to assist the administering authorities to decide the appropriate approval conditions for the project.

EMPs are designed to be dynamic documents, which will be reviewed and revised as the project progresses through public consultation, detailed design, to construction, operational and decommissioning phases. It is envisaged that the final EMPs for each component of the project will provide additional, more detailed guidance for construction and operational personnel, regulators and stakeholders prior to the application for the respective environmental authorities.

The following five preliminary EMPs were prepared as part of the EIS process for the GLNG Project:

- Coal Seam Gas Fields EMP;
- Gas Transmission Pipeline EMP;
- LNG Facility EMP;
- Marine Facilities EMP; and
- Access Road and Bridge EMP.

Each EMP has been prepared as a 'standalone' document, to be used as the basis for actively managing activities as the project progresses. The EMPs outline the overarching performance criteria, control strategies, monitoring, auditing and corrective actions proposed in accordance with the TOR.

Each of the preliminary EMPs has incorporated the Santos Environmental Health and Safety Management System (EHSMS) that will provide the overarching management system for all of the project's activities.

This preliminary EMP relates to construction and operation of the coal seam gas (CSG) fields which form part of the GLNG Project. The EMP has been developed to cover the petroleum activities associated with the construction and operation of the CSG fields.

This preliminary EMP has been structured to satisfy the requirements of the relevant EPA guidelines and related operational policies. Information obtained during the preparation of this EIS has provided the basis for preparing this EMP. The EMP proposes environmental management strategies to prevent or minimise environmental harm while allowing for environmentally sustainable development. Monitoring, corrective actions and reporting requirements form part of this EMP, which will ensure that the proposed management strategies are being properly implemented.

The final CSG Fields EMP will be used to support an application for one or more environmental authorities (petroleum activities) for the respective CSG fields. It is envisaged that a single project authority will apply to all of the relevant petroleum tenements and related petroleum activities within each CSG field.

11.2 Objectives

The objectives of this EMP are to provide:

- Evidence of practical and achievable plans to ensure that the project's environmental requirements are complied with;
- An integrated plan for monitoring, assessing and controlling potential impacts;
- Local, State and Commonwealth authorities with a common focus for approval conditions and compliance with policies and conditions; and

- The community with evidence that the CSG fields development will be managed in an environmentally acceptable manner.

This EMP will be reviewed and updated to reflect knowledge gained during the course of the assessment of the GLNG Project. Changes to the EMP will be made in consultation with the relevant authorities where necessary.

11.3 Links to EIS

Potential environmental issues requiring management and monitoring were identified during the impact assessment process and are detailed throughout this EIS.

This EMP has been structured to provide a link between the proposed authorised activities, the receiving environment and the selection of appropriate management strategies to prevent or minimise any potential environmental harm arising from the development of the GLNG Project. The EMP also incorporates monitoring and corrective actions to ensure compliance with the commitments made in the EIS and the conditions of any statutory approvals. The management strategies outlined within this EMP were selected after detailed investigations of potential environmental impacts.

A number of other key aspects of construction, operation and commissioning phases for the CSG fields have been included such as planning and approval processes, emergency response procedures and incident management.

11.4 Legislation

Section 1 of this EIS specifies the legislation and policies controlling the approval process for the CSG fields. Appendix C provides a list the development approvals required for the GLNG project.

Environmental requirements of all relevant legislation will be addressed within the EMP. The requirement of local government, the community and other stakeholders have also been addressed.

11.5 Santos Environment, Health and Safety Management System (EHSMS)

Santos has a company-wide EHSMS which provides a structured framework for effective environmental and safety practice across all of its activities and operations (see Section 1.2.3.3). The framework has been developed to ensure compliance with AS/NZS ISO 14001:1996 *Environmental Management Systems – Specification* with guidance for use and Australian Standard 4801:2000 *Occupational Health and Safety Management Systems – Specification* with guidance for use.

The EHSMS framework consists of multiple layers, the key components being management and hazard standards that have been developed as part of the EHSMS. These standards guide the implementation of the EMPs. The management standards define the requirements necessary to ensure that environmental (health, safety and process safety) risk is systematically managed.

Hazard standards detail the controls required to manage the risks of specific hazards to acceptable levels. These apply to all Santos operations. They contain specific requirements for planning and undertaking activities and include checklists and references to internal and external approvals and controls.

The environment hazard standards that have been developed under the Santos EHSMS are shown in Table 11.5.1. These standards (where applicable) will apply to the construction and operation of the CSG fields.

Table 11.5.1 EHSMS Management, Hazard and Environment Standards

(Version 3.0 September 2007)

Standard	Title
Management Standards	
EHSMS01	Environment, Health and Safety Policies
EHSMS02	Legal and Other Obligations
EHSMS03	Objectives and Targets
EHSMS04	Improvement Plans
EHSMS05	Responsibility and Accountability
EHSMS06	Training and Competency
EHSMS07	Consultation and Communication
EHSMS08	Document and Record Management
EHSMS09	Hazard Identification, Risk Assessment and Control
EHSMS09.1	Job Hazard Analysis and Stepback
EHSMS09.2	Hazard Studies
EHSMS09.3	Workplace Inspections
EHSMS09.4	Behaviour Improvement
EHSMS09.5	Environmental Impact Assessment and Approvals
EHSMS10	Contractor and Supplier Management
EHSMS11	Operations Integrity
EHSMS11.1	Design Basis - Facility Equipment
EHSMS11.2	Facilities Design and Construction
EHSMS11.3	Pre-Startup EHS Review
EHSMS11.4	Structural Integrity
EHSMS11.5	Mechanical Integrity
EHSMS11.6	Ignition Control
EHMSM11.7	Critical Protection Systems
EHSMS11.8	Operating Procedures and Safe Practices
EHSMS11.9	Maintenance
EHSMS11.10	Fire Risk Management
EHSMS11.11	Decommissioning and Abandonment
EHSMS11.12	Operated by Others
EHSMS12	Management of Change
EHSMS12.1	Critical Drawing and Control System Change
EHSMS12.2	Vacant (Changes to operating procedures and safe work practices is now addressed in EHSMS11.8
EHSMS12.3	Disablement of Protective Devices (Bridging)
EHSMS12.4	Substitution of Materials and Equipment Components
EHSMS12.5	Acquisition and Divestment of Assets
EHSMS12.6	Management of Personnel Change
EHSMS13	Emergency Preparedness
EHSMS13.1	First-Aid & Medical Facilities
EHSMS14	Monitoring, Measuring and Reporting

Standard	Title
EHSMS15	Incident and Non-Conformance Investigation, Corrective and Preventative Action
EHSMS15.1	Injury Management
EHSMS16	Management System Audit and Assessment
EHSMS17	Management Review
Environment Hazard Standards	
EHS01	Land Disturbance
EHS02	Underground and Secondary Containment Systems
EHS03	Produced Water Management
EHS04	Waste Management
EHS05	Air Emissions
EHS06	Greenhouse Gas Management
EHS07	Energy Efficiency
EHS08	Contaminated Site Management
EHS09	Weed and Pest Animal Control
EHS10	Water Resource Management
EHS11	Indigenous Cultural Heritage Management (for Australian Operations)
EHS12	Noise Emissions

11.6 Responsibilities

Santos will be responsible for ensuring that this EMP is implemented. The assignment of roles, responsibilities and accountability will be in accordance with the Santos Management Standard EHSMS 05.

All Santos and contractor staff will be responsible for the environmental performance of their activities and for complying with the general environmental duty as outlined in the *Environmental Protection Act 1994* (EP Act). Section 319(1) of the EP Act states that *"a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise the harm."*

Santos staff and contractors will be responsible for implementing the final EMP and for undertaking work in a manner which complies with all relevant environmental standards, adheres to all legislative requirements, and ensures that all environmental objectives associated with the work are achieved. Contract documents will include the necessary environmental specifications and commitments and require compliance with the EMP, construction specifications, technical drawings and the general environmental duty.

11.7 Monitoring Programs

Monitoring of the CSG fields will be in accordance the Santos Management Standard EHSMS14 and regulatory requirements. This standard requires that environmental monitoring, measuring and reporting be considered and where appropriate implemented.

Routine environmental monitoring of the Coal Seam Gas Field activities will be conducted to ensure performance standards put in place are met. Monitoring, undertaken by Santos operational and corporate personnel and specialist service providers, will be periodically conducted in accordance with site-specific monitoring plans.

Specialist studies to investigate particular aspects of the environment (e.g. flora and fauna, weeds, hydrological risk) will be periodically commissioned when a need is determined during environmental review and risk assessment.

11.8 Reporting and Auditing

Compliance audits will be conducted by Santos in accordance with Santos Management Standards EHMS 14 and 16, against the requirements against the requirements of this EMP the construction procedures, relevant legislation, license and permit conditions and industry standards.

All inspection and audit reports of environmental performance will be stored in the Audit and Inspection Manager (AIM). AIM is an electronic database that is used to enable corrective actions identified during the inspection / auditing process to be recorded, tracked and closed out. The information will be made available to the relevant regulatory authorities as required.

In addition to the monitoring and reporting requirements documented in the relevant sections of the EMP, the following auditing regime will be implemented:

- During construction, internal audits will be undertaken at regular intervals to verify that all work is proceeding in accordance with the EMP;
- A post-construction audit of the CSG wells, compressor stations, pipelines, water management ponds and other related infrastructure will be conducted annually for two years following construction to evaluate revegetation, erosion and soil stability, weed control, watercourse alteration prevention and success of bed and bank re-profiling; and
- During operations, internal audits of environmental compliance will be undertaken on a regular basis.

Any environmental incident, hazard, near miss, non-conformance and third party complaint will be managed in accordance with Santos Management Standard EHMS 15. Unwanted events will be recorded and managed by the Santos Incident Management System (IMS). In the case of non-conformances identified during an audit or inspection, the notification and rectification of the non-conformance shall be managed through the Santos AIM.

Regulatory agencies will be notified of any reportable environmental incident or non-conformance with statutory approvals within the appropriate timeframe and as soon as practicable.

Relevant records supporting inspections and audits (in addition to monitoring and other critical aspects of the management system) will be generated and maintained. In accordance with the various statutory approvals required for the project, Santos will report annually to the administering authorities on the petroleum activities undertaken during the previous 12 months.

11.9 Training and Communications

In accordance with Santos Management Standard EHSMS06, all Santos personnel, contractors and visitors are required to undertake appropriate environmental training and induction programs.

All managers and supervisors will be responsible for ensuring that personnel under their control have the requisite competencies, skills and training to carry out their assigned tasks in accordance with the requirements of the EMP. They will also be responsible for identifying additional training and competency requirements.

All staff will complete a comprehensive project induction. The induction will include a comprehensive review of environmental requirements and standards, safety, and access protocols. All project supervisors and managers will have additional detailed training on the use and implementation of the EMP.

All managers and supervisors will hold regular toolbox meetings with personnel to discuss issues associated with their scheduled work. This will include highlighting and discussing relevant environmental issues.

11.10 Review

This EMP will be a dynamic document. The EMP will be reviewed regularly and revised to reflect project changes and new developments. Revisions will include, but not be limited to:

- Inclusion of final organisational structures for construction and operational staff and the allocation of responsibilities in line with the organisational structure;
- Inclusion of relevant approval conditions arising from the project's approval and subsequent permits, authorities and/or licences; and
- Inclusion of any site-specific elements relevant to new developments as they occur during the life of the project.

Additional revisions will occur on an as-needed basis, including revisions to address items identified during incident investigations, inspections or audits.

Santos will be responsible for regular review of the environmental management system to achieve continuous improvement in environmental performance.

11.11 Description of Relevant Petroleum Tenures

Section 3 of this EIS provides a detailed description of the relevant petroleum authorities that are encompassed by the CSG fields component of the GLNG Project. The section:

- Provides a description of each CSG field and its general location; and
- Identifies each relevant petroleum tenure that will be covered by the EMP.

Section 6 of this EIS provides real property descriptions of the CSG fields and the relationship with disturbance types, identifies the topographic features, places and/aspects of potential interest to the administering authorities or stakeholders.

11.12 Description of Relevant Petroleum Activities

Section 3 of this EIS provides a detailed description of the relevant petroleum activities that will be undertaken as part of the development and expansion of the CSG fields for the project. The section includes a description of:

- The type and scale of the proposed petroleum activities;
- The petroleum operations and environmentally relevant activities carried out on the site;
- The planned project life identifying construction, operation, decommissioning and rehabilitation phases;
- Activities which may cause environmental harm; and
- Strategies for the rehabilitation and remediation of environmental harm caused by petroleum activities.

The petroleum legislation requires the title holder of a petroleum authority to submit a work program for an authority to prospect (ATP) or development plan for a petroleum lease (PL). These documents detail the petroleum activities that will be undertaken during a specific period of time. CSG fields development is an incremental process where the future years' development is based on the current year success and performance. Santos intends to submit work programs and development plans in line with the proposed expansion of the CSG fields as documented within this EIS.

Section 5 of this EIS provides a detailed waste inventory for the CSG fields. A comprehensive waste management plan has been developed that details the proposed source, nature, composition, rate and the immediate or ultimate destination of wastes generated during the development and expansion of the CSG fields.

11.13 Description of Environmental Values, Potential Impacts and Proposed Management Strategies

Section 6 of this EIS provides a detailed description of the CSG fields' environmental values, potential impacts from the proposed activities, environmental protection objectives and management strategies to mitigate those impacts. The potential impacts on environmental values that were identified through the EIS process form the basis for developing the most appropriate mitigation measures.

The assessment of the beneficial or adverse effects has included an assessment of the following aspects:

- Magnitude or relative size of impact in relation to the environmental value being affected;
- Severity of any adverse effect or scale of beneficial outcome;
- Duration of the effect (for example the impact may range from a seasonal change, or it may end with the petroleum activity or extend beyond cessation of the petroleum activity); and
- An indication of the level of uncertainty and any assumptions used to address the uncertainty in any of the data or proposed commitments to protect the environmental values.

In relation to Sections 11.10, 11.11 and 11.2 of this EMP, the EIS provides appropriate maps, plans and/or aerial photographs to identify the location of CSG fields, related infrastructure and environmentally sensitive areas.

11.14 Rehabilitation Program and Financial Assurance

This EMP incorporates a rehabilitation program and decommissioning plan for the CSG fields. Sections 3 and 6 of this EIS outline the rehabilitation objectives, performance criteria and strategies that will be employed for rehabilitating the areas disturbed by petroleum activities within the CSG fields.

The EP Act requires the holder of an environmental authority (petroleum activities) to provide a financial assurance in the amount and form required by the administering authority (the EPA) as security to ensure compliance with an environmental authority or to cover costs or expenses, or likely costs or expenses, associated with rehabilitation of disturbed areas should the holder default on their rehabilitation obligations. The calculation of financial assurance must be in accordance with the EPA guideline document *Financial Assurance for Petroleum Activities*.

The amount of financial assurance may change over the life of the project. The amount is defined as the maximum total rehabilitation cost to complete rehabilitation of all disturbed areas at any one time, which may vary on an annual basis due to progressive rehabilitation. This includes any disturbance that occurred under a prerequisite or replaced petroleum authority. The amount required for the financial assurance must be the highest total rehabilitation cost calculated for any year of the EMP.

During the application stage for the relevant environmental authority, Santos will calculate the required financial assurance for the initial development of the respective CSG fields. The financial assurance will be calculated using the EPA guidelines and will be regularly reviewed in accordance with any statutory requirements.

11.15 CSG fields Environmental Management Plan Overview

This preliminary CSG fields EMP contains both construction and operational elements. The following construction and operational management elements have been incorporated into this EMP:

- Planning and Approval Processes;
- Seismic and Geophysical Survey;
- Corehole and Exploration Drilling;
- Pilot Testing (Appraisal Wells);
- Production Wells and Gas Processing Facilities;
- Gas and Water Gathering System;
- Clearing and Grading;
- Trenching;
- Hydrotesting;
- Rehabilitation;
- Associated Water Management;
- Access;
- Flora and Fauna Management;
- Mosquito Management;
- Weed Management Plan;
- Groundwater Management;
- Surface Water Management;
- Land Contamination;
- Waste Management;
- Chemical and Dangerous Goods Management;
- Noise and Vibration;
- Air Quality;
- Greenhouse Gas;
- Cultural Heritage;
- Social and Community;
- Emergency Response;
- Incidents and Complaints; and
- Decommissioning.

11.16 Environmental Management Plans

11.16.1 Planning and Approval Processes

Element/Issue	Planning and Approval Processes
Operational Policy or Management Objective	To ensure that all CSG fields developments are planned and approved according to the appropriate environmental planning procedures.
Performance Criteria	• All potential impacts are identified for new activities. • Mitigation measures are developed for all new activities. • All approvals are in place prior to any field activities taking place. • Environmental impacts are within authorised limits.
Implementation Strategy	Planning and approval processes will be implemented in accordance with Santos' Environmental, Health and Safety Management System's Management Standard EHSMS9.5 (*Environmental Impact Assessment and Approvals*). This standard provides guidance on systematically identifying and managing potential environmental and social impacts associated with development activities and ensuring relevant statutory approvals

Element/Issue	Planning and Approval Processes
	are obtained. Because of the large area of the CSG fields and the ongoing nature of exploration and gas production a two-phased approach will be adopted for development planning and impact assessment. All new field development will use this process as follows: • Phase 1 is the assessment undertaken in this EIS. • Phase 2 (post EIS) will be the implementation of the protocol for ongoing impact assessment of each project element once its nature and location becomes known over the life of the field development. It will be managed through the existing internal Santos impact assessment process and will feed directly into the Environment, Health and Safety Management System (EHSMS). Phase 2 process will include: • Constraints maps to be developed and used for the initial planning of proposed field developments. • An assessment of proposed actions according to the nature of the development and approvals required. This process will trigger one of the following three options: – *Internal approval - propose to disturb new ground*. The potential impacts of new ground disturbance will be investigated through site scouting undertaken in accordance with the existing Santos protocol (EHSMS 9.5). This assessment will ensure that the proposed footprint is as small as possible, that there will be minimal interference with existing or proposed land uses, and that broader and cumulative impacts are considered. Management controls and/or monitoring commitments will be developed and internal Santos approval obtained. – *Internal approval - no new ground disturbance*. Where no new ground is to be disturbed, a desktop assessment is to be undertaken as the proposed activity will be occurring in an area that will have been scouted previously or has been significantly disturbed through other land uses. Management controls and/or monitoring commitments will be developed and internal Santos approval obtained. – *External approval required*. Approval external to Santos will be sought when the proposed activity triggers additional regulator approvals. This will generally result in detailed field investigations and assessment studies. Management controls and/or monitoring commitments will be developed and the relevant application(s) lodged. Strategies to minimise land use impacts will include: • Avoiding (where practicable) good agricultural land. • Avoiding sensitive or listed communities or species. • Avoiding (where practicable) smaller land parcels where the relative impact will be greater. • Locating (where practicable) gathering pipelines and access roads along fence lines and property boundaries. • Locating (where practicable) development activities away from the more intensively used areas of the property. • Liaising with each relevant landholder regarding their site-specific land use practices and ways to minimise interference from project activities. • Minimising the lease area required for well development. • Rehabilitating as quickly as possible the areas no longer required following drilling and well development. Landholder consultation will be undertaken for all development proposals and the results incorporated into the planning process. On agricultural properties involved in quality assurance and certification programs, Santos will implement additional risk minimisation strategies as necessary to ensure that certifications are maintained.
	Santos will discuss with landholders options for retaining CSG infrastructure (such as fencing, access tracks, hardstand areas, and dams) following decommissioning. This will be discussed prior to developing the decommissioning plan. If the infrastructure is not required by the landholder, it will be removed and the site rehabilitated.

Element/Issue	Planning and Approval Processes
Monitoring and Auditing	Each new development proposal will be checked to ensure that the correct planning and approval procedures have been followed.
Reporting and Corrective Action	The following will be classified as an incident or failure to comply: • Planning or approval process not followed for new development project. • Development undertaken without prior approval to proceed. • Approval conditions not complied with. Should an incident or failure to comply occur, a selection of the following corrective actions will be considered where relevant: • Development activities will cease until approvals are received. • Development activities modified to comply with approval conditions. • Planning and approval process implemented.

11.16.2 Seismic and Geophysical Survey

Element/Issue	Seismic and Geophysical Surveys
Operational Policy or Management Objective	To carry out seismic and geophysical surveys in a safe and responsible manner with minimal interference to the landholder or risk to the environment.
Performance Criteria	• No complaints from landholders. • Environmental impacts are within authorised limits.
Implementation Strategy	**Survey Methods** The vibroseis method is the preferred method of data acquisition for seismic surveys and will generally be the method that will be utilised to carry out the seismic survey. The method utilises a generator and vibrator pad and hydraulically transmits vibrations through a range of frequencies into the earth. Given this, the following activities will be implemented: • Geophysical equipment will be regularly inspected and maintained in good working condition. • Width of seismic lines will be minimised. • Compliance with EHS12 (*Noise Emissions).* • The shot hole (dynamite) method will be utilised in areas where preservation of vegetation cover is critical. • Surveys will be performed during daytime working hours wherever possible. • Appropriate land rehabilitation measures will be implemented in disturbed areas as soon as surveys are completed. This may involve backfilling holes used in the survey. Other geophysical surveys such as aeromagnetics and multi-transient electro-magnetics are under active consideration. These have minimal environmental impacts as the surveys involve towing a passive receiver behind a low-flying aeroplane and measuring the variation in the earth's naturally occurring magnetic field. Noise emitted by the aircraft will only be experienced temporarily as surveys are typically of short duration (1-2 weeks), and are generally conducted during the day. **General** • All activities associated with land disturbance will be discussed with the landholder prior to commencement. • A field environmental assessment will be carried out prior to the acceptance of a site for a new activity. This assessment will determine habitats, vegetation, and areas of significant environmental/cultural value to be avoided. The assessment will also outline areas or issues requiring particular environmental management.
Monitoring and Auditing	A post-survey completion inspection will be undertaken by the CSG fields Environmental Manager.

Element/Issue	Seismic and Geophysical Surveys
Reporting and Corrective Action	• Any non-compliance will be reported by the CSG fields Environmental Manager to the relevant operational manager for corrective action. • Non-compliance and incident reports will be closed out by the CSG fields Environmental Manager. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out.

11.16.3 Corehole and Exploration Drilling

Element/Issue	Corehole and Exploration Drilling
Operational Policy or Management Objective	To carry out corehole and exploration drilling in a safe and responsible manner with minimal interference to the landholder or risk to the environment.
Performance Criteria	• No complaints from landholders. • Environmental impacts are within authorised limits.
Implementation Strategy	• All activities associated with land disturbance will be discussed with the landholder prior to commencement. • A field environmental assessment will be carried out prior to the acceptance of a site for a new activity. This assessment will identify habitats, vegetation, and areas of significant environmental/cultural value to be avoided by the development. The assessment will also outline areas or issues requiring particular environmental management. • Relevant measures in the Access Management and Clearing and Grading elements of this EMP will be implemented in the conduct of the drilling programs. • Exploration wells will be lined with steel casing which is cemented to the side of the hole to isolate any aquifers that are intersected. • The area required for drilling coreholes and exploration wells will be minimised (generally 60 m x 60 m). • Disturbed areas will be appropriately rehabilitated when work is finished at each site. • Surface vegetation and topsoil will be stockpiled in designated areas within the drilling lease and will be used for future rehabilitation works. • Fencing of the site boundaries in some sites will be completed to limit the disturbance of the activities to the immediate vicinity of the drilling site. • An earthen pit or sump will be constructed to contain cuttings removed from the appraisal well. This will be managed consistent with the Surface Water Management element of this EMP. • Disposal of drill cuttings will be by means of burial on-site. Other wastes will be disposed off in accordance with the Waste Management element of this EMP.
Monitoring and Auditing	Drilling activities will be monitored by the drilling contractor or its environmental representative in coordination the Drilling Environmental Adviser. Post-completion inspection will be completed by the CSG fields Environmental Manager.
Reporting and Corrective Action	• Recommendations and corrective actions arising from monitoring and auditing will be referred to the drilling contractor for action. • Routine work reports (as appropriate) will be recorded and reviewed by the drilling manager or its environmental representative. • Non-compliance and incident reports will be closed out by the CSG fields Environmental Manager or further elevated as necessary. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.4 Pilot Testing (Appraisal Wells)

Element/Issue	Pilot Testing (Appraisal Wells)
Operational Policy or Management Objective	To carry out pilot testing activities in a safe and responsible manner with minimal interference to the landholder or risk to the environment.
Performance Criteria	• No complaints from landholders. • Environmental impacts are within authorised limits. • No uncontrolled release of gas emissions and water from wells and pipelines.
Implementation Strategy	• All activities associated with land disturbance will be discussed with the landholder prior to commencement. • A field environmental assessment will be carried out prior to the acceptance of a site for a new activity. This assessment will identify habitats, vegetation, and areas of significant environmental/cultural value to be avoided by the development. The assessment will also outline areas or issues requiring particular environmental management. • Relevant measures in the Access Management and Clearing and Grading elements of this EMP will be implemented in the conduct of the drilling programs. • Well locations will be selected to avoid environmentally sensitive areas such as watercourses, vegetation and existing infrastructure. • Water will be managed in accordance with the Associated Water Management element of this EMP and licence requirements.
Monitoring and Auditing	During the drilling activities the site and associated areas will be regularly inspected to assess the effectiveness of the environmental protection measures. This will be done by the drilling contractor or its environmental representative in coordination with the CSG fields Environmental Manager.
Reporting and Corrective Action	• Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports (as appropriate) will be recorded and reviewed by the drilling manager or its environmental representative. • Non-compliance and incident reports will be closed out by the CSG fields Environmental Manager or further elevated as necessary. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.5 Production Wells and Gas Processing Facilities

Element/Issue	Production Wells and Gas Processing Facilities
Operational Policy or Management Objective	To carry out the conversion of pilot wells into production wells in a safe and responsible manner with minimal interference to the landholder or risk to the environment.
Performance Criteria	• Access for landholders and third parties maintained. • No unplanned or uncontrolled disturbance to third party infrastructure. • Successful rehabilitation of the area surrounding the operation well lease area. • No uncontrolled release of gas emissions and water from wells and pipelines.
Implementation Strategy	• All activities associated with land disturbance will be discussed with the landholder prior to commencement. • Gas processing facilities will be located in previously cleared areas where practicable. • To control gas emissions, the blowout preventer in the pilot wells will be replaced by a control valve assembly. • Once the wells become operational, i.e., once they are connected to the gas and water pipeline gathering system, the appraisal and pilot facilities will be removed. The lease area will be reduced to the smallest possible area (typically 0.1 to 0.5 ha).

Element/Issue	Production Wells and Gas Processing Facilities
	• The surrounding disturbed area will be rehabilitated and revegetated to control erosion. • Road access to each operational well will be required for construction and maintenance purposes. Applicable measures under the Access Management element of this EMP will be followed. • Access will be via existing farm roads or tracks where practicable. Alternatively, a new access built to local farm track standard will be constructed.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*). The production wells will be regularly inspected to assess the effectiveness of the environmental protection measures. This will be done by CSG fields Environmental Manager or delegate.
Reporting and Corrective Action	• Reporting will be conducted under EHSMS14 (*Monitoring, Measuring and Reporting*). • Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports will be recorded and reviewed by the CSG fields Environmental Manager. • Non-compliance and incident reports will be closed out by the CSG fields Environmental Manager or further elevated as necessary. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.6 Gas and Water Gathering System

Element/Issue	Gas and Water Gathering System
Operational Policy or Management Objective	To manage the impacts of pipe laying and backfilling of the gas and water gathering system such that: • Disturbance to landholders and third parties is minimised. • The likelihood of erosion or subsidence is minimised. • Topsoil is preserved for rehabilitation. • There are no significant barriers to the re-establishment of overland flow of water.
Performance Criteria	• No landholder complaints. • No inversion of subsoil and topsoil. • Well compacted trench line with appropriately installed trench breakers and contour banks.
Implementation Strategy	• All activity will be conducted in accordance with EHS01 (*Land Disturbance*). • Extent of clearing will be minimised. • The period of time between trenching and backfilling will be minimised to prevent erosion of exposed soils. • Appropriate means, such as trench blocks (i.e. trench/sack breakers) and compaction of backfilled soils, will be used to prevent erosion along the backfilled trench. • Gentle crown to be left over the trench line to allow for future settlement of soils, with appropriate breaks to allow for natural surface water flows across the ROW. • Compaction is to be completed prior to spreading topsoil. • Trenching to be completed in accordance with the Trenching element of this EMP.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*). The gathering network will be regularly inspected to assess the effectiveness of protection measures with particular attention to areas such as soils management and trench compaction.

Element/Issue	Gas and Water Gathering System
Reporting and Corrective Action	• Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports will be recorded and reviewed by each supervisor/manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.7 Clearing and Grading

Element/Issue	Clearing and Grading
Operational Policy or Management Objective	To manage the impact of site clearing and disturbance such that: • Impacts on vegetation and ecological communities are minimised. • Cleared material is stored appropriately and able to be effectively used during restoration activities. • The rehabilitation success of the disturbed areas is optimised.
Performance Criteria	• No complaints from landholders. • Environmental impacts are within authorised limits.
Implementation Strategy	• Clearing and grading will be conducted in accordance with EHS01 (*Land Disturbance*). • No clearing of protected vegetation for field development will occur until appropriate permits have been obtained. • All clearing boundaries will be illustrated on construction drawings and clearly marked in the field. • Clearing will be limited to the minimum practicable. • Where practical, trees will be trimmed rather than felled. Individual trees to be retained or preserved will be clearly marked in the field, before clearing activities begin. • Clearing for pipelines in riparian vegetation or wetlands will be kept to a minimum to safely construct the pipeline and meet other environmental requirements (e.g. erosion control, spoil storage). • Blade clearing of trees will occur to retain the root mass wherever practicable. • Cleared vegetation will be stockpiled (not burnt) for respreading during rehabilitation. • Cleared vegetation will be stockpiled outside watercourses behind the flood line. • Cleared vegetation or soil will not be pushed up against trunks of trees. • Cleared vegetation and soil will not be stored against fence lines. • Where appropriate, containment devices (e.g. silt fences) will be used to preserve stockpiled soils to prevent siltation of any land surface water or blockage of any existing drainage channels. • Soil stockpiles will not be placed within the bed or banks of watercourses. • The stockpiles will be breached in appropriate locations (coinciding with designated access roads or tracks, fence lines) to allow vehicular, stock and wildlife access. Vehicular movement over stockpiled soil will not be allowed. • Soil and surface stability will be maintained at all times (e.g. temporary erosion control berms, drains and sediment barriers will be installed as necessary and maintained until final construction clean-up is completed). • Water trucks will be used (particularly in hot and windy conditions) where necessary, on access roads to reduce dust generation. • Vehicle speeds will be restricted on unsealed roads.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*). All cleared areas will be regularly inspected to assess the effectiveness of the environmental protection measures. This will be undertaken by the CSG fields Environmental Manager.

Element/Issue	Clearing and Grading
Reporting and Corrective Action	• Reporting will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*). • Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports (as appropriate) will be recorded and reviewed by each supervisor / manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.8 Trenching

Element/Issue	Trenching
Operational Policy or Management Objective	To manage the impacts of trenching activities such that: • Disturbance to landholders and third parties is minimised. • The likelihood of erosion or subsidence is minimised. • Topsoil quality is protected. • Adverse impacts to native fauna are minimised.
Performance Criteria	• Subsoil segregated from topsoil and vegetation. • Ramps and fauna exit points installed and maintained. • Access for landholders and third parties maintained. • No unplanned or uncontrolled disturbance to third party infrastructure.
Implementation Strategy	• All activity will be conducted in accordance with EHS01 (*Land Disturbance*). • The location of the existing third party infrastructure along the trench alignment will be identified on the alignment sheets and marked physically on the ground prior to trenching activities. • Impacts at stream crossings will be minimised. • Crossing of infrastructure will be completed in accordance with agreements reached with infrastructure owners/managers. • Known contaminated areas will be avoided. • Topsoil stockpiles will not exceed 1.5 m in height. • Trench spoil (sub soils) will be stockpiled separately to topsoil and vegetation. • Trench spoil will be stockpiled outside watercourses, and/or behind containment structures so as to prevent siltation of any land or surface water or blockage of any existing drainage channels. • Regular gaps and spaces in the topsoil, subsoil and vegetation stockpile will be provided for fauna movement. • The distances between gaps in stockpiles will be reduced at approaches to stream crossings. • Trench plugs will be utilised at appropriate intervals to minimise erosion and allow access across the trench lines. • The pipeline trenches will be left open for the minimum time practicable. • The trench will not be left open for extended periods on slopes leading to drainage lines or watercourses. • Ramps will be installed in the trench at a minimum of 500 m intervals to allow the easy egress of fauna trapped in the trench. In areas of high fauna density, additional ramps, branches, hessian sacks or similar devices to enable small fauna to exit the trench will be used. • Temporary sediment and erosion control devices will be used and reinstated upon completion. • Temporary access tracks to be removed when no longer required.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*).

Element/Issue	Trenching
	Completed trenches will be regularly inspected to assess the effectiveness of protection measures with particular attention to areas such as soils management and trench compaction. During construction, trenches will be regularly inspected to assess the effectiveness of protection measures, with particular attention paid to issues such as soils segregation, erosion control devices, fauna escape ramps and access across the easement.
Reporting and Corrective Action	• Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports will be recorded and reviewed by each supervisor/manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.9 Hydrotesting

Element/Issue	Hydrotesting
Operational Policy or Management Objective	To protect the quality of local land and water resources during pipeline hydrotesting.
Performance Criteria	• Appropriate permits obtained prior to drawing and discharging water. • No existing water sources depleted to provide hydrotesting water. • No adverse impacts on soil or surface water as the result of discharging hydrotesting water.
Implementation Strategy	• Relevant permits to draw and discharge water obtained. • Pipe sections crossing water bodies will be tested prior to installation. • Inspection of all pipeline section welds, or hydrotesting of pipeline sections before installation under water bodies, will be performed in accordance with construction specifications/procedures. • Biocides, where required, will be biodegradable. • Where biocides are added, discharge water will be aerated. • Prior to discharge of hydrotesting water, the CSG fields Environmental Manager will be consulted about requirements for water quality testing. Where the water source and water quality is known, and no chemicals have been added, water quality testing may not be required. • Hydrotesting water discharged to land will be discharged in such a way as to prevent runoff into any watercourse or drainage lines, flooding or erosion (e.g. against a splash plate or other dispersive device in order to aerate, slow and disperse the flow). • Discharge of hydrotesting water will comply with all regulatory and landholder requirements.
Monitoring and Auditing	• Inspections of hydrotesting water source against requirements of relevant permits and discharge locations will be undertaken. • Hydrotest water quality will be monitored prior to discharge.
Reporting and Corrective Action	• Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports will be recorded and reviewed by each supervisor/manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager or delegate.

11.16.10 Rehabilitation

Element/Issue	Rehabilitation
Operational Policy or Management Objective	To restore land to surrounding condition and restore land use and access as far as practicable.
Performance criteria	• No complaints from landholders. • Rehabilitation is completed in accordance with regulatory requirements. • No significant change in drainage pattern. • Pipeline tracks stabilised with no significant erosion events.
Implementation Strategy	• Rehabilitation of disturbed areas will be undertaken progressively as works proceed and as soon as practicable. • Subsoil will be respread and compacted over trenches, with crown development, and used for the construction of contour banks on steep slopes and above banks at water crossings. • Disturbed areas will be deep ripped prior to topsoil spreading. • Disturbed areas will be re-profiled to original or stable contours, re-establishing surface drainage lines and other land features. • Topsoil application will only take place after subsoil respreading and compaction and will be evenly spread and left with a slightly rough surface. • Driving vehicles on freshly topsoiled areas will be prohibited. • Imported topsoil, of an appropriate quality and weed free, may be required for repairs, and will only be used with landholder approval. • Flagging used to identify clearing boundaries and sensitive features will be removed. • Erosion and sediment control measures will be installed where necessary. Existing soil erosion measures will be reinstated to a condition at least equal to the pre-existing state. • Cleared native vegetation will be respread over the disturbed areas to assist in the distribution of seed stock and provide shelter for fauna. Distribution of vegetation will be controlled to ensure that any erosion or subsidence that may occur will not be hidden from view during subsequent monitoring inspections. • Native groundcover and shrubs will be encouraged to revegetate wherever appropriate to minimise habitat barrier effects in significant habitat areas. • Where revegetation is proposed, it will take place as soon as practicable after topsoil is spread. • A reseeding plan based on soil types, existing local vegetation characteristics and landholder preferences will be developed. • Seeding will be utilised in areas where rapid restoration is required e.g. watercourse crossings and areas of high erosion potential. • Where disturbed areas are to be re-planted or reseeded, preference will be given to local native species. However, non-native and non-invasive grass seed stock may be used where approved by the landholders to provide environmentally acceptable short term surface stability. • Trees and shrubs will be allowed to regenerate naturally on cleared areas not required to be kept tree free for pipeline protection and maintenance. • Where applied, seed will be evenly dispersed over the entire disturbed area. • Fertilisers and soil supplements will be used only as necessary with the agreement of landholders and authorities. • Where access routes are to be retained, but are not public access, the entry will be disguised (e.g. by dog-legging, brush spreading). • Disused silt fences will be removed. • Fences or other barriers will be installed where appropriate and where approved by the landholder to minimise unauthorised access.

Element/Issue	Rehabilitation
Monitoring and Auditing	Monitoring and auditing of rehabilitation will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*). Until regrowth is established, significant (e.g. riparian zones) areas and any seeded areas will be monitored regularly to ensure growth and if necessary appropriate reapplication of seed will be carried out. The success of restoration will be assessed by comparing the percentage cover and species diversity on rehabilitated areas with that of adjoining land. Monitoring will also include an assessment of the effectiveness of weed control measures.
Reporting and Corrective Action	• Any sites not displaying stability (after 12 months) will undergo additional rehabilitation using a method approved by the relevant authority or landholder. • Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine reports will be recorded and reviewed by each supervisor/manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager or delegate.

11.16.11 Associated Water Management

Element/Issue	Associated Water Management
Operational Policy or Management Objective	To manage associated water from the wells in a manner that is safe and responsible and with minimal risk to surrounding communities or to the environment.
Performance criteria	• Beneficial use of associated water in accordance with the associated water management plan. • Environmental impacts are within authorised limits.
Implementation Strategy	Associated water will be managed in accordance with EHS03 (*Produced Water Management*) and the detailed adaptive associated water management plan which will be prepared as a separate plan within the broader EMP charter. Proposed associated water management options will be determined through a risk management approach for a particular field at a given time. The final level of treatment of associated water and its end use will be determined in accordance with the associated water management plan. Infrastructure developed for associated water will be located to minimise disturbance and managed using a variety of strategies as follows: **Water Management Ponds** • Adopt best practice design, construction, operation and maintenance, decommissioning/rehabilitation. • Appropriately site the pond above the 1 in 100 year flood level and away from environmentally sensitive areas. • Use HDPE lining in combination with a clay liner to limit seepage and potential contamination of soil profiles and shallow groundwater. • Explore opportunities to provide the associated water management ponds to local landholders for future use. **Brine Containment Ponds** • Adopt best practice design, construction, operation and maintenance, decommissioning/rehabilitation. • Use of a heat exchange system to recover waste heat from compressors and maximise evaporation rates and limit the footprint of the pond. • Remediate impacted areas and/or clay cap, mound and divert surface water away from the pond footprint area. • Explore potential to provide the ponds to landholders following the project.

Element/Issue	Associated Water Management
	Water Treatment Facilities • The preferred water treatment method where low concentrations of total dissolved solids are required is currently reverse osmosis (RO). Other treatment technologies may be adopted depending on water quality and quantity. Facilities will be managed in accordance with licence conditions. **Discharge to Grade** • Treat of water to background levels prior to discharge to surface waters. • Discharge to grade limited to flow periods only or at downstream locations where sufficient baseflow exists. • Establish a water quality and river health monitoring program to detect environmental change outside of agreed limits. • Monthly inspection and water quality sampling at the location of discharge and downstream. • Implement erosion controls at the point of discharge. **Reinjection into Aquifers** • Develop a regional bore inventory to establish existing groundwater users and baseline conditions (groundwater flow and level). • Undertake studies to identify underlying aquifers suitable for injection (i.e. poor quality and unlikely to be of beneficial use). • Establish a monitoring and reporting program. **Irrigation** • Treat associated water to an appropriate standard prior to irrigation. • Implement an adaptive irrigation management plan to guide the ongoing modification, and where necessary re-direction of the irrigation. • Undertake regular monitoring of in soil chemistry and structure appropriate management actions.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*) and licence conditions. Monitoring systems will be established to provide feedback on: • The overall performance of ponds. • Surface water quality. • Groundwater quality. The effectiveness of the various water management strategies will be regularly monitored by the CSG fields Environmental Manager.
Reporting and Corrective Action	• Reporting will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and licence conditions. • All environmental monitoring and auditing activities will be reported by the CSG fields Environmental Manager. • Reports will be submitted to the EPA as required. • Recommendations and corrective actions arising from audits will be implemented. • The water management strategy will be modified as necessary based on the results of ongoing risk assessment, audit and monitoring results.

11.16.12 Access

Element/Issue	Access
Operational Policy or Management Objective	To utilise, to the extent practicable, existing cleared areas and access tracks so as to: • Minimise impacts to native flora and fauna. • Minimise impacts to soil and water. • Reduce the likelihood of the spread of weeds. • Minimise impacts on visual amenity. • Minimise the number of access tracks and diversions. • Minimise disruption to landholders and third parties. • Manage road and track usage, and achieve satisfactory road and site rehabilitation. • Minimise damage to existing road networks.
Performance Criteria	• No complaints from landholders, authorities and the public. • Access tracks and work areas/sites are readily manageable and able to be rehabilitated using standard techniques. • Erosion and sediment control in place.
Implementation Strategy	• Route alignment, location of accommodation facilities, storage and additional work areas and new access tracks will be based on, to the extent practicable, the following criteria: – Avoiding unduly steep or rugged terrain. – Avoidance of areas of significant environmental value. – Avoidance of areas subject to flooding. – Avoidance of conflicting land uses. – Maximise the use of existing roads and tracks. – Minimise the width of tracks. – Landholder requirements. – Provision of adequate road access. – Proximity to existing infrastructure. • Existing roads and tracks will be used where practicable. • If necessary, existing tracks and roads will be upgraded to the applicable engineering design standards. • Only designated access tracks will be used by construction vehicles, including personnel vehicles. • Property access will be provided for landholders at all times. • Property fences and gates will be installed, maintained and reinstated to a condition at least equal to the pre-existing condition. • Gates will be left as found. If closed gates are required to be open for a period of time, they will not be left unattended unless by prior agreement with the landholder. • Where there is a risk of land degradation, access during wet weather will be undertaken in consultation with the relevant landholder. • Unless otherwise requested by the landholder, temporary access tracks will be rehabilitated to a condition compatible with the surrounding land use upon completion of pipeline construction. • Public and private access tracks will be reinstated to the pre-construction condition. • Workforce education, signage and boundary demarcation will be used to ensure vehicles remain on designated access tracks. • New tracks will be located as close to fences or property boundaries as possible subject to the requirements of the landholder.
Monitoring and Auditing	Access roads will be regularly inspected to assess the effectiveness of protection measures with particular attention to erosion control, topsoil management and waste management.

Element/Issue	Access
Reporting and Corrective Action	• Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports (as appropriate) will be recorded and reviewed by the CSG fields Environmental Manager. • Non-compliance and incident reports will be closed out by senior management. • Any landholder complaints will be recorded and appropriate corrective actions implemented and closed out by the CSG fields Environmental Manager.

11.16.13 Flora and Fauna Management

Element/Issue	Flora and Fauna Management
Operational Policy or Management Objective	To appropriately minimise and manage impacts to the ecological values of the CSG fields and to rehabilitate disturbed areas to as close as practical to the pre-constructed condition.
Performance Criteria	• Minimal disturbance of terrestrial flora and fauna during field development and operation. • No unplanned or unapproved damage to flora and fauna. • Restoration of disturbed areas to equivalent of surrounding area.
Implementation Strategy	• All development areas to be selected to avoid disturbance to endangered, vulnerable and rare flora species as far as possible and to minimise fragmentation and habitat disturbance of protected fauna species. • Appropriate permits for the clearing of vegetation will be obtained prior to the commencement of construction. • The location of vegetation to be retained will be clearly indicated on all construction drawings. • Flagging of clearing boundaries through areas of significant vegetation will be completed prior to disturbance. • Disturbance will be restricted to the designated work areas. • Physical barriers will be installed around significant vegetation areas in order to restrict access and avoid disturbance. • Clearing of hollow bearing trees will be avoided as far as possible. • Measures will be implemented to minimise the potential for loss or fragmentation of habitat during construction and decommissioning including retaining habitat trees, using existing disturbed/cleared areas and locating linear features adjacent to exiting infrastructure where possible. • Clearing and disturbance in riparian areas will be minimised to that necessary to safely construct and meet other environmental requirements (e.g. separation of stockpiles, erosion control). • Appropriate controls will be implemented during any diversion of watercourses to minimise the impact of the project on aquatic species. • Measures to minimise the impacts of temporary damming of watercourses for the construction of crossings and obstruction of fish passage will be implemented and include appropriate controls and monitoring during the diversion of watercourses. • Trees and shrubs will be allowed to regenerate naturally on cleared areas not required to be kept clear for project activities (subject to landholder agreement). • Fauna escape ramps or ladders and water soaked, sawdust filled hessian sacks (used to support pipes prior to lay-in) will be placed at regular intervals along the open trenches. • Liaison with wildlife rescue organisations or individuals. • Minimise speed limits in high-potential areas for faunal impact. • Cleared native vegetation and timber will be respread over the pipeline easements to aid regeneration and provide fauna habitat (subject to landholder agreement). • A biodiversity offset strategy and management plan will be developed.

Element/Issue	Flora and Fauna Management
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*). All cleared areas will be regularly inspected to assess the effectiveness of the environmental protection measures. This will be undertaken by the CSG fields Environmental Manager or delegate. Ongoing monitoring will be undertaken to assess the success and integrity of rehabilitation measures and ensure appropriate follow-up rehabilitation measures are implemented.
Reporting and Corrective Action	• The CSG fields Environmental Manager and construction contractor will maintain records of all monitoring and auditing activities. • Recommendations and corrective actions arising from audits and reviews will be implemented. • Routine work reports will be recorded and reviewed by each supervisor or manager. • All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated (including reporting to relevant agencies where this is warranted/required). • Non-compliance and incident reports will be reviewed and closed out by the CSG fields Environmental Manager.

11.16.14 Mosquito Management

Element/Issue	Mosquito Management
Operational Policy or Management Objective	To prevent the occurrence of potential mosquito breeding sites and the presence of adult mosquitoes.
Performance criteria	• Minimal number of potential mosquito breeding sites created by preventing water from ponding.
Implementation Strategy	• Mosquito management will be conducted in accordance with EHS09 (*Weed and Pest Animal Control*). • Depressions in the ground surface (such as wheel ruts) will be filled as soon as practicable to prevent the ponding of water. • Pools of stagnant water will be drained and/or the depressions filled. • Storage containers capable of ponding water will be either discarded after use or stored in an inverted position (care will be taken to ensure that ponding does not occur in waste storage areas). • Erosion and washdown practices will be controlled to prevent the formation of standing water pools in natural water courses adjacent to the sites.
Monitoring and Auditing	The CSG fields Environmental Manager will liaise with Queensland Health and the relevant local councils for assistance in choosing a suitable method of laviciding / eradication should this be necessary.
Reporting and Corrective Action	The following represent an incident or failure to comply in regard to mosquito management: • An increase in the numbers of potential mosquito breeding sites on-site. • An increase in the numbers of larvae and/or mature mosquitoes on-site. • Significant incidences of mosquito bites are reported. • Mosquito management strategies are not implemented. Should an incident or failure to comply occur, a selection of the following actions will be taken: • An investigation will be undertaken into why directives are not being carried out. • Employees will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation.

11.16.15 Weed Management Plan

Element/Issue	Weed Management
Operational Policy or Management Objective	To prevent the introduction and spread of weed species due to CSG fields development activities.
Performance Criteria	• No new weed infestation in the CSG fields as a result of the project's activities. • No spread of weeds from infested areas to previously weed-free areas. • Disturbed area restored to a state that minimises the potential for ongoing weed colonisation.
Implementation Strategy	• Weed management will be conducted in accordance with EHS09 (*Weed and Pest Animal Control*). • Weed inspection of new development areas to be undertaken prior to activities beginning and the location of declared plants and other noxious weeds recorded and controlled. • Upon commencement of development activities all vehicles, equipment and portable infrastructure (including trailers, generators, workshop and accommodation huts etc.) will be washed at a designated weed washdown area. Access roads will be defined to minimise the potential for the spread of weed species and protocols established for washdown of vehicles travelling along them. • Cleaning procedures will be thorough to remove all soil or organic matter from the surfaces of vehicles, equipment and portable infrastructure, including the undercarriage in weed control areas. Personnel will also ensure all soil and organic matter is removed from clothing and footwear. • Washdown by air or water of a vehicle and/or portable equipment will be supervised by trained personnel and the vehicles details recorded in a vehicle washdown register to be maintained by the construction contractor. • All vehicles will be certified and registered as clean before they are permitted access to the CSG fields.
Monitoring and Auditing	Pre-development weed surveys will be undertaken and all identified areas of weed occurrence identified. All work areas and access tracks will be regularly inspected to assess the effectiveness of protection measures with particular attention to vehicle movements, washdown activities and records and restoration activities.
Reporting and Corrective Action	• The CSG fields Environmental Manager will maintain records of all weed monitoring and control activities. • Areas left bare due to weed control will be reseeded in consultation with the landholder. • Non-compliance and incident reports will be reviewed and closed out by the CSG fields Environmental Manager.

11.16.16 Groundwater Management

Element/Issue	Groundwater Management
Operational Policy or Management Objective	To protect the quality of the existing groundwater resources.
Performance Criteria	• Groundwater quality will not be impacted by development activities. • Spill containment facilities constructed in accordance with AS 1940 (2004) and AS 3780 (1994). • Environmental impacts are within authorised limits.

Element/Issue	Groundwater Management
Implementation Strategy	• Chemical and fuel storage areas will be bunded in accordance with AS 1940 and AS 3780 to prevent the seepage of any contaminants into the groundwater system. • Storage and loading/decanting areas for fuels and chemicals will be paved and bunded and located outside the floodplain of the stream channels (i.e. approximately 50 m away from the top bank). • All refueling activities will be undertaken within a paved and bunded area. • All bunded areas will drain to sumps via suitably sized oil-water separators. • Sumps will not be discharged to grade unless water quality testing shows that it is suitable to do so. If it cannot be discharged it will be removed for treatment. • Potentially contaminated water will be treated prior to being reused on site (e.g. possible irrigation water). • Ensure wells are constructed (and decommissioned) to avoid interconnection between aquifers. • Wells will be lined with steel casing which will be cemented to the side of the hole to isolate any aquifers that are intersected. • All exploration wells within the CSG fields, historic and proposed, will be backfilled (if not modified as monitoring piezometers) to prevent them acting as direct conduits between aquifers. • Associated water management and brine containment ponds will be lined to prevent seepage of contaminated water to the underlying groundwater system. • Any injection of water into aquifers which have been subjected to loss of head due to coal seam depressurisation will be undertaken selectively to reduce the area of influence of the CSG production on aquifer drawdown.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and EHSMS16 (*Management System Audit and Assessment*) and licence conditions. The integrity of storage and management facilities and bunded areas will be routinely inspected. A groundwater monitoring program will be implemented to include the following: • Regional bore census. • Inventory of groundwater users within the coal seam aquifers. • Monitoring in deep aquifers to enable forecasting of pressure drops from CSG removal. • Groundwater levels in selected Great Artesian Basin units and hydrochemical monitoring. • Background water quality sampling and analyses.
Reporting and Corrective Action	Records will be kept of the volumes of hydrocarbon/fuel purchased, used, disposed and recycled. Reporting will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*). The CSG fields Environmental Manager will report on the results of the groundwater monitoring program. Reports will be submitted to the CSG fields Manager and the relevant regulatory agencies as required. The following is to be classified as an incident or failure to comply in relation to groundwater management: • Breach in integrity of bunds. • Non-compliance with AS 1940 and AS 3780. • Detection of groundwater contamination or drawdown. Should an incident or failure to comply occur in relation to groundwater management, a selection of the following corrective actions will be considered where relevant: • Rectify storage/handling non-compliance. • Contain and remediate or dispose of contaminated material/contaminants. • Investigate and implement measures to prevent recurrence.

11.16.17 Surface Water Management

Element/Issue	Surface Water Management
Operational Policy or Management Objective	To minimise the potential impacts associated with erosion and to prevent the release of contaminants that may adversely affect downstream surface water quality.
Performance Criteria	• Prevention of direct or indirect release of contaminants resulting from CSG fields development activities to surface waters. • Minimisation of incidences of accelerated erosion as a result of construction activities. • Environmental impacts are within authorised limits.
Implementation Strategy	A stormwater management plan (including installation of appropriate infrastructure, adoption of monitoring controls and obtaining appropriate licences as required) will be developed, implemented and maintained across the project's components. **Construction and Field Development Activities** The following strategies will be implemented to minimise potential impacts on receiving surface waters: • Preparation and implementation of a site-specific construction erosion and sediment control plan in accordance with the Institution of Engineers Australia – Erosion and Sediment Control Guidelines (1996). • Plan infrastructure locations to avoid artesian springs. • Where necessary, divert watercourses either by low flow diversion or coffer dams with pumping. Monitor water quality. • Installation of temporary drainage works (channels and bunds) together with sediment and erosion control for new disturbance areas. • Where appropriate, installation of temporary sediment basins to capture sediment-laden runoff from site. • Ponds and dams will be designed, operated and decommissioned in accordance with relevant guidelines and industry standards. • Using pumps to maintain dry working conditions in temporary excavations, rather than constructing temporary open channels for gravity drainage of temporary excavations, where gravity channeling is not acceptable. • Stabilise cleared areas not required for development activities with vegetation or appropriate surface treatments as soon as practicable following clearing to minimise erosion. • Provision of appropriate storage areas for fuels and dangerous goods with spill cleanup kits, and ensuring that relevant personnel are trained in appropriate handling of such materials and spill prevention. • Restricting vegetation clearance to the smallest area necessary. • Seeding of long-term topsoil stockpiles will be carried out with an appropriately designed seed mix. **Appraisal Drilling, Pilot Testing and Gas Processing Facilities** This section describes measures that are generally applicable during appraisal and pilot drilling activities and at gas processing facilities. The sites will be divided into different areas according to activity/land-use. Surface water management strategies for each area are listed below. *Maintenance, Drilling, Process and Chemical Storage Areas* • Maintenance and process areas will be built on paved and bunded areas. The bunded areas will each have a sump to collect stormwater. • Bunded storage areas for fuels and dangerous goods will be provided with spill clean-up kits in accordance with Australian standards (AS 1940:2004 and AS 3780:1994). • All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas. • All bunded areas will drain to sumps via suitably sized oil-water separators. • Sumps will not be discharged to grade unless water quality testing shows that it is suitable to do so. If it cannot be discharged it will be removed for treatment.

Element/Issue	Surface Water Management
	• Oily water drainage will be designed to allow the introduction of cleaning equipment to the system. • Drilling muds will be retained within lined ponds. *Disturbed Areas* • The stormwater drainage from disturbed areas less likely to be contaminated by hydrocarbons or chemicals will pass through a "first flush" collection and retention system. • Excess runoff above the "first flush" volume will by-pass the retention system and will be discharge directly into the stormwater outlet system. • The potentially contaminated "first flush" volume retained will be the runoff resulting from a 1 in 5 year average rainfall intensity for the site (as derived using methods outlined in Australian Rainfall and Runoff (1987)) for the critical duration storm for the site. • Retained "first flush" water will be tested and if suitable it will be discharged into the stormwater outlet system. Alternatively it will be treated prior to discharge. • All stormwater pipes and open drainage channels will be designed in accordance with best-practice engineering principles. *Undisturbed Areas* • Undisturbed/ 'clean' areas will generate stormwater runoff quantity and quality similar to natural runoff. This runoff will be diverted around potentially contaminated catchments and be discharged.
Monitoring and Auditing	Monitoring and auditing will be conducted in accordance with EHSMS14 (Monitoring, Measuring and Reporting) and EHSMS16 (Management System Audit and Assessment) and licence conditions. Monitoring requirements for erosion and sediment control will include routine visual inspections, including following all significant storm events. Inspections will include the integrity of diversion bunds, drains and storage facilities, and cover housekeeping to ensure stormwater runoff does not contain rubbish or contaminants. A water quality monitoring program will be implemented to assess impacts and the effectiveness of mitigation measures on receiving water quality and to detect environmental change outside of agreed limits.
Reporting and Corrective Action	Reporting will be conducted in accordance with EHSMS14 (*Monitoring, Measuring and Reporting*) and licence conditions. Any non-compliance will be reported to the relevant regulatory agencies as required.

11.16.18 Land Contamination

Element/Issue	Land Contamination
Operational Policy or Management Objective	To manage potential soil contamination during the development of the CSG fields.
Performance Criteria	• No contamination of soil. • Spill containment facilities constructed in accordance with AS 1940 (2004) and AS 3780 (1994).
Implementation Strategy	**Prevention** Strategies for the prevention of potential land contamination will include: • Consultation with landholders prior to development commencing to determine whether any potential areas of contamination are located within the proposed development area. • Construction of appropriate spill containment facilities for all chemicals and fuel storage areas (in accordance with AS 1940 and AS 3780). • Establishing and maintaining a hazardous materials register detailing the location and quantities of hazardous substances including their storage, use and disposal. • Induction and training of personnel and implementation of safe work practices for

Element/Issue	Land Contamination
	minimising the risk of spillage. • All ponds to carry sufficient freeboard to prevent overtopping. **Containment** • If suspect contamination is found during earthworks, work in that area will stop until a suitably qualified person has inspected the site, the hazard has been assessed and appropriate action has been taken. • Any hydrocarbon spillage from storage areas, diesel and chemical spills from construction equipment, and industrial waste spills will be contained and treated/remediated in accordance with appropriate legislative requirements. • If an area of contamination is reported, the cause will be identified, the material analysed, and an appropriate management strategy developed. The impact may be contained by isolating the source or implementing controls around the affected site. • EPA approval will be obtained if contaminated material must be removed from the work area. **Remediation** • Remediation of contaminated land will use the most appropriate available method to achieve required commercial/industrial guideline validation results. • Validation sampling of any remediated area will be used to establish the site as "clean" as per the relevant EPA Contaminated Land and National Environment Protection Measure (NEPM) Guidelines.
Monitoring and Auditing	The integrity of storage facilities for hazardous materials and wastes and bunded areas will be routinely inspected. Any hydrocarbon spillage from storage areas or diesel or chemical spills will be reported.
Reporting and Corrective Action	The CSG fields Environmental Manager will keep records of contamination incidents. The following will be classified as an incident or failure to comply in relation to soil contamination management: • Breach in integrity of bunds. • Non-compliance with AS 1940 and AS 3780. • Known contaminated area not managed. Should an incident or failure to comply occur in relation to soil contamination management, a selection of the following corrective actions will be considered where relevant: • Rectify storage/handling non-compliance. • Contain and remediate or dispose of contaminated material/contaminants. • Investigate and implement measures to prevent recurrence. • Any known contaminated sites will be reported to the EPA.

11.16.19 Waste Management

Element/Issue	Waste Management
Operational Policy or Management Objective	To ensure that the CSG fields development adheres to the waste management hierarchy of avoid, reuse, re-use and recycle. Where this is not possible, to dispose of waste in the most appropriate manner.
Performance Criteria	• No inappropriate disposal or management of waste. • No contamination of soil, air or water as a result of waste handling.
Implementation Strategy	The Santos Waste Management Standard (EHS04) shall be followed to ensure appropriate mitigation measures are implemented in the management of waste. **General** • Management strategies for specific waste streams will be developed prior to the activity commencing. • On completion of each CSG field component, all waste material will be removed from the workplace. No wastes will be buried or disposed of on-site without local government and/or EPA approval.

Element/Issue	Waste Management
	• The CSG fields Environmental Manager will advise designated disposal areas. • General waste will be collected and transported generally to local council approved disposal sites. • Food wastes will be collected, where practicable, considering health and hygiene issues, for disposal off-site. • Refuse containers will be located at each worksite. • Where practical, wastes will be segregated and reused / recycled (e.g. scrap metal). • All personnel will be instructed in project waste management practices and procedures as a component of the environmental induction process. • Suppliers will be requested to minimise packaging where practicable. • Emphasis will be placed on housekeeping and all work areas will be maintained in a neat and orderly manner. • All equipment and facilities will be maintained in a clean and safe condition. **Liquid Waste** • Sewage or grey water will either be collected for treatment and disposal off-site or treated via an on-site treatment system and disposed of to effluent absorption beds or irrigation fields. • The treatment method will be selected in consultation with a relevant local authority and EPA and the relevant environmental authority obtained. • Sewage effluent absorption beds and/or irrigation fields will be selected and designed to ensure that: – Sensitive areas are avoided. – There is no ponding or runoff of effluent. – The receiving environment has the capacity to assimilate the contaminants. **Hazardous Waste** • Chemical wastes will be collected in 200 litre drums (or similar sealed container) and appropriately labelled for safe transport to an approved chemical waste depot or collection by a liquid waste treatment service. • Storage, transport and handling of all chemicals will be conducted in accordance with all legislative requirements. • Containment bunds and/or sumps will be drained periodically to prevent overflow and subsequent pollution of the surrounding land and/or water body. • All hazardous wastes will be appropriately stored in bunded areas away from watercourses and in accordance with legislative requirements. • Hazardous wastes, such as solvents, rust proofing agents and primers will be managed in accordance with the requirements of relevant legislation and industry standards. • A hazardous materials inventory will be prepared. • Material safety data sheets (MSDS) for hazardous materials will be available at all work sites. • Hydrocarbon wastes, including lube oils, will be collected for safe transport off-site for reuse, recycling, treatment or disposal at approved locations.
Monitoring and Auditing	Housekeeping checks will be undertaken to ensure waste is being stored correctly and that no littering is occurring. Work and accommodation sites will be inspected after relocation to ensure that no waste material remains. The quality characteristics of treated effluent (if discharged to land) will be monitored in accordance with the environmental authority conditions.

Element/Issue	Waste Management
Reporting and Corrective Action	• Records will be maintained of all monitoring and auditing activities. Results will be reported to the CSG fields Environmental Manager at agreed intervals. • Recommendations and corrective actions arising from audits and reviews will be implemented. • All incidents that deviate from normal operating conditions will be reported and corrective action initiated (including reporting to relevant agencies where this is warranted/required) by the construction contractor to prevent a recurrence of the incident. • Non-compliance and incident reports will be reviewed and closed out by the CSG fields Environmental Manager.

11.16.20 Chemical and Dangerous Goods Management

Element/Issue	Chemical and Dangerous Goods Management
Operational Policy or Management Objective	To ensure that storage and handling of chemicals and dangerous goods does not cause environmental harm or harm to persons.
Performance Criteria	• No hazardous goods contamination of the environment. • Storage and handling procedures correct and appropriate.
Implementation Strategy	• Spill control procedures will be prepared and personnel trained. • Dangerous goods will be stored and handled as per the requirements of relevant Australian Standards. • Dangerous goods will, where appropriate (e.g. outside locations), be stored in bunded areas away from watercourses. • MSDSs for chemicals and dangerous goods will be available on-site. • Waste dangerous goods, which cannot be recycled, will be transported to a designated disposal site as approved by the local authority. • Spills of dangerous goods will be rendered harmless and collected for treatment and disposal at a designated site, including cleaning materials, absorbents and contaminated soils. • Absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in their correct use. • Protective clothing, appropriate to the materials in use, will be provided. • Relevant permits will be held and conditions of permits met.
Monitoring and Auditing	Regular inspections to ensure that chemical storage facilities continue to meet Australian Standards. Audits will include inspection of dangerous goods storage areas.
Reporting and Corrective Action	• The construction contractor will maintain records of all monitoring and auditing activities and report results to the CSG fields Environmental Manager at agreed intervals. • Recommendations and corrective actions arising from audits and reviews will be implemented. • All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated (including reporting to relevant agencies where this is warranted/required). • Non-compliance and incident reports will be reviewed and closed by senior mangement.

11.16.21 Noise and Vibration

Element/Issue	Noise and Vibration
Operational Policy or Management Objective	To construct and operate the CSG fields infrastructure in a manner to minimise the impact of noise and vibrations on surrounding residences.
Performance Criteria	**Construction** The noise criteria to be achieved for evening and night-time construction noise will be the night-time sleep disturbance criteria of L_{Amax} 50 dB(A). It is common practice that noise limits are relaxed during daytime construction works, where it may not be practicable to achieve operational noise limits. The reasons for the relaxation of limits include (i) construction activities are not a long-term noise source, (ii) operational noise can be controlled within enclosures or buildings, whereas these buildings are not completed during the construction phase. **Operation** The operational noise criteria will be based on the EPAs Ecoaccess Guideline: Planning for Noise Control. The relevant criteria are: • Background creep criteria for general LNG facility noise. • Low frequency noise criteria for low frequency noise sources. • Specific noise level criteria for flares. Where existing ambient noise level are already above the recommended noise levels, noise generated by the GSG development will be maintained at approximately 8 or 10 dB(A) below the existing ambient noise level.
Implementation Strategy	**Construction** The following strategies will be implemented during the construction activities: • Use of the quietest plant and equipment that can economically undertake the work wherever possible. • Select facility locations in accordance with required offset distance guidelines. • Regular maintenance of equipment in order to keep it in good working order. • Construction work will generally be limited during evening and night-time periods (6.30pm to 6.30am). On Sundays/Public Holidays it will only be undertaken in accordance with “best practice” noise management where sensitive noise receptors are present. • Adjacent landholders/residents will be notified prior to any atypical noise events outside of daylight hours. • Operators of construction equipment will be made aware of the potential noise problems and of techniques to minimise noise emission through a continuous process of operator education. • Utilise existing community consultation mechanisms to provide access to information for the community and maintain positive relations with landholders. • Best available work practices will be employed on-site to minimise occupational noise levels. • High efficiency mufflers will be fitted to appropriate construction equipment. • Consideration will be given to sourcing so-called “quiet” white-noise reversing alarms whose annoying character diminishes quickly with distance and self-adjusting alarms which adjust emission levels relative to the local background noise level. • Nearby residents will be made aware of the times and duration of the major construction activities. **Operations** • Adopt minimum offset buffer distances between noise sources and sensitive receptors to negate the need for mitigation measures. Where this buffer distance is not able to be achieved, noise mitigation measures such as an enclosure or partial enclosure may be incorporated. • Where compressor stations are located within 1,000 m of a noise sensitive receptor, specific noise mitigation measures will be implemented such as:

Element/Issue	Noise and Vibration
	– Hospital grade exhaust silencer. – Secondary absorptive exhaust silencer. – Absorptive splitter attenuator. – Mineral wool insulated panels with steel facing (inner perforated). • Production wells will not be located within 300 m of a noise sensitive receptor. If this is not possible noise mitigation measures such as an enclosure or partial enclosure will be considered. • Flare noise mitigation measures will be considered including lagging of piping, muffling the gas stream jets (or via water injection), and incorporating design measures such as appropriate diameter flare ports. • Items of equipment will be specified to comply with the occupational noise level limit of 85 dBA at 1 m. • Items which cannot comply with the 85 dBA specification will be contained in buildings or specially designed acoustic enclosures. • Designs for compressors and blowers will incorporate proprietary acoustic enclosures as necessary.
Monitoring and Auditing	**Construction** Construction equipment will be inspected regularly to maintain optimal working conditions. Throughout construction, the contractor's environmental representative will undertake regular environmental audits. **Operation** Once the construction of each compressor station is completed, a noise monitoring program to meet the requirements of the project's environmental authority will be implemented. Should a justifiable noise complaint be received, an appropriately designed monitoring program will be implemented. Any noise monitoring will be conducted in accordance with the Environmental Protection Policy (EPP(Noise)).
Reporting and Corrective Action	• The construction contractor will maintain records of all monitoring and auditing activities and report results to the CSG fields Environmental Manager. • Recommendations and corrective actions arising from audits and reviews will be implemented. • All incidents that deviate from normal operating conditions will be reported and corrective action initiated (including reporting to relevant agencies where this is warranted/required). • Non-compliance and incident reports will be reviewed and closed out by the CSG fields Environmental Manager.

11.16.22 Air Quality

Element/Issue	Air Quality
Operational Policy or Management Objective	To complete the development of the CSG fields in a manner that maintains ambient air quality within the local airshed.
Performance Criteria	• No excessive dust emissions during construction. • No air quality-related complaints from nearby landholders. • Compliance with the Santos EHS Management System Hazard Standard, EHS05 Air Emissions.

Element/Issue	Air Quality
Implementation Strategy	• Consult with and advise any landholders with the potential to be impacted by construction dust emissions prior to the commencement of activities. • Vehicles and machinery will be fitted with appropriate exhaust systems and emission control devices. The devices will be maintained in good working. • Construction sites and access roads will be watered on an as-required basis to minimise the potential for environmental nuisance due to dust. Watering frequency will be increased during periods of high risk (e.g. high winds). • The extent and period of exposure of exposed surfaces will be minimised. • Exposed surfaces will be promptly restored following construction to stabilise the disturbed surface and limit the potential for dust generation. • Vehicles will be operated in a fuel efficient manner so as to minimise fuel consumption and vehicle emissions at all times. • Air will be injected into flares to make flares smokeless, thus reducing particulate matter emissions. • Field operation protocols will be designed to minimise flaring, venting and other emissions sources. • Maintenance procedures will ensure that the duration and frequency of venting of gas via the main release valves is minimised. • The feasibility of converting cold vents to flares will be investigated. • Monitor compressor station emissions and ensure compliance with licence conditions • A “no burning” policy will be implemented as far as practical. • A phase 2 (post EIS) impact assessment will be undertaken once the specific configuration and location of the compressor stations is known.
Monitoring and Auditing	The various components of the CSG fields infrastructure and associated access areas will be regularly inspected to assess the effectiveness of air quality mitigation measures. Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.
Reporting and Corrective Action	• The CSG fields Environmental Manager will maintain records of all monitoring and auditing activities and reports. • Recommendations and corrective actions arising from audits and reviews will be implemented. • All incidents that deviate from normal operating conditions will be reported and corrective action initiated (including reporting to relevant agencies where this is warranted/required) to prevent a recurrence of the incident. • Non-compliance and incident reports will be reviewed and closed out by senior management.

11.16.23 Greenhouse Gas

Element/Issue	Greenhouse Gas
Operational Policy or Management Objective	To minimise the generation of greenhouse gas emissions from the GLNG Project.
Performance Criteria	• Compliance with Greenhouse Challenge Plus program. • Compliance with Santos’ Climate Change Policy.
Implementation Strategy	The GLNG Project will comply with the requirements of the *Energy Efficiency Opportunities Act 2006* including the assessment of energy use patterns and opportunities for reduced energy consumption every 5 years. The GLNG Project will be included in Santos’ Greenhouse Challenge inventories and reporting under the Greenhouse Challenge Plus program. Santos will manage greenhouse gas emissions by: • Implementing energy efficiency measures throughout the project life.

Element/Issue	Greenhouse Gas
	• Continuously improving the efficiency of extracting CSG. • Continuing to reduce the carbon intensity of Santos' products by focussing on energy efficiency, technology development and by embedding a carbon price in all activities. • Using energy more efficiently by identifying opportunities to implement energy efficiency projects and report their progress. • Examining the commercial development of low emission technologies, including storage solutions, which will contribute towards long-term aspirational greenhouse gas emission reduction targets. • Pursuing no flaring or venting of associated gas, unless there are no feasible alternatives. • Continuing to publicly disclose Santos' greenhouse emissions profile and carefully examine forecast emissions. • Monitoring climate change risk and develop appropriate adaptation strategies for their business. • Assisting governments and engage with other stakeholders on the design of effective and equitable climate change regulations and policy. Santos will avoid land clearing to the greatest extent possible by actively seeking drilling locations that have already been cleared and minimising the land clearing in areas where it is required. To minimise the opportunity for well blow-out and the uncontrolled release of CSG into the atmosphere Santos will: • Ensure a blow-out preventer is provided with all flares. • Ensure appropriate processes and procedures are developed and implemented for dealing with such an event on site - e.g. appropriate job safety analysis and standard operating procedures. • Ensure competence of drillers and operators.
Monitoring and Auditing	All actions undertaken and goals set to reduce GHG emissions will be assessed, reported and verified as required under Santos company policy and under the various agreements and programs of which Santos is a member.
Reporting and Corrective Action	• The Environmental Manager will maintain records of all monitoring and auditing activities and reports. • Recommendations and corrective actions arising from audits and reviews will be implemented. • Any incidents of non-compliance with policies or commitments will be investigated and appropriate mitigation measures implemented. • Non-compliance and incident reports will be reviewed and closed out by senior management.

11.16.24 Cultural Heritage

Element/Issue	Cultural Heritage
Operational Policy or Management Objective	To protect the cultural heritage values of the CSG fields.
Performance Criteria	• Compliance with the requirements of the *Aboriginal Cultural Heritage Act 2003* and the relevant Cultural Heritage Management Plans (CHMPs). • No disturbance of any place on the Queensland Heritage Register in accordance with the requirements of the *Queensland Heritage Act 1992*.

Element/Issue	Cultural Heritage
Implementation Strategy	Santos is committed to the protection of cultural heritage sites and the sensitive handling of any accidental discovery of sites. Santos will: • Finalise the development of relevant CHMPs with representatives of the Aboriginal groups that have a current registered native title application. • Complete cultural heritage surveys and develop and implement agreed management measures for the management of cultural heritage in accordance with the principles and procedures detailed in the approved CHMPs. • Where potential non-indigenous heritage material is identified and likely to be disturbed, determine the significance of the site in consultation with the EPA and undertake relocation / preservation of the material. A project specific conservation management plan will be prepared to establish mitigation, management and approval procedures. • Include cultural heritage issues in the project induction program and involve representatives from the Aboriginal Parties in the development and implementation of such programs.
Monitoring and Auditing	Auditing of compliance with the CHMPs in accordance with the processes defined within the CHMP. Auditing of any non-indigenous cultural heritage encountered during CSG fields activities.
Reporting and Corrective Action	Any signs of disturbance of artifacts will be reported to the CSG fields Environmental Manager and the relevant indigenous stakeholders. Any of the following will constitute an incident or failure to comply: • Failure to prepare and/or implement a CHMP. • Unauthorised disturbance of any artifacts. • Failure to implement a cultural heritage monitoring program. In the event of an incident or failure to comply, the commitment that has not been undertaken will be reviewed and modifications implemented as appropriate.

11.16.25 Social and Community

Element/Issue	Social and Community
Operational Policy or Management Objective	To minimise any social disruption to the local communities within the CSG fields.
Performance Criteria	No complaints from local communities about the construction or operation of the CSG fields.
Implementation Strategy	To minimise social and community impacts from the project Santos will: • Provide on-site accommodation for construction and operational workers. • Negotiate land access and compensation agreements with those private landholders or landowners within the area of the petroleum authority directly impacted by the CSG field activities (once plans and design details have been determined) in accordance with the *Petroleum Act 1923 and Petroleum* and the *Gas (Safety and Production) Act 2004*. • Develop a social management plan to monitor social impacts associated with the project and work with local services and stakeholders to develop practical solutions. • Adopt local procurement policies in order to enhance local economic benefits. • Implement its apprenticeship program in the Roma and Fairview districts where practicable, with the continued primary goal of providing permanent jobs for fully-trained apprentices. • Minimise social impacts on indigenous persons in the project area by the implementation of the Santos Aboriginal Engagement Plan. • Contribute to local liveability programs and will initiate a community consultation and awareness campaign to promote project benefits to the community.

Element/Issue	Social and Community
Monitoring and Auditing	Auditing of compliance with the social management plan and the Aboriginal Engagement Plan.
Reporting and Corrective Action	The following will be classified as an incident or failure to comply: • Failure to prepare or comply with the social management plan or the Aboriginal Engagement Plan. • Receipt of complaints from local communities members about the construction or operation of the CSG fields. In the event of an incident or failure to comply, the commitment that has not been undertaken will be reviewed and modifications implemented as appropriate.

11.16.26 Emergency Response

Element/Issue	Emergency Response
Operational Policy or Management Objective	To ensure that project personnel can respond effectively and efficiently in the event of an emergency associated with development and operation of the CSG fields.
Performance Criteria	• Emergency plans for construction developed and in place prior to activities commencing. • All personnel familiar with emergency procedures and their role in the event of emergency, and drills undertaken.
Implementation Strategy	Santos will prepare a detailed emergency response plan which will include consideration of the following: • Response procedures in the event of a fire, chemical release, spill, leak, explosion, equipment failure, bomb threat, natural disaster (including severe storm, bushfire and flood events) or any other likely emergency. • Communication arrangements and contact details. • Roles and responsibilities of responsible personnel. • Emergency controls and alarms. • Evacuation procedures. • Emergency response equipment. • Leak detection and control points. • Training requirements. • Site access and security. Santos will minimise development in high bushfire and landslide risk areas. Where development is located in these areas, Santos will employ safety management procedures to minimise the likelihood of the project initiating or spreading bushfire. Management measures include: • Design standards to control risk of fire occurring. • Inspection and monitoring. • Area around well heads cleared of vegetation. • Emergency response procedures. Santos will employ a range of procedures to minimise the risk of landslide including: • Investigate alternative sites away from landslide risk areas. • Utilise appropriate construction materials, equipment and techniques. • Cease work during periods of potential landslide activity (e.g. high rainfall events). • Minimise vegetation clearing, stabilise slopes. • Regular inspection and monitoring. • Emergency response procedures.
Monitoring and Auditing	The effectiveness of the emergency response plan will be regularly tested and audited.

Element/Issue	Emergency Response
Reporting and Corrective Action	The CSG fields Health and Safety Manager will be responsible for compiling the results of testing and auditing programs. The following constitute incidents or failure to comply: • Emergency response plan is not prepared or implemented. • Emergency response equipment is not provided. • Emergency response training is not undertaken. • Emergency response procedures not followed in the event of an incident. • Bushfire or landslide risk mitigation strategies not implemented. In the event of an incident or failure to comply, one or more of the following actions will be undertaken as appropriate: • Prepare or implement the emergency response plan or risk mitigation strategy. • Provide the necessary equipment or training. • Investigate why the emergency response procedures were not followed and implement mitigation measures.

11.16.27 Incidents and Complaints

Element/Issue	Incidents and Complaints
Operational Policy or Management Objective	To manage and respond to any environmental or social incidents and complaints from the community regarding the development and operation of the CSG fields.
Performance Criteria	Incidents and complaints regarding environmental and social issues will be minimised and mitigation measures implemented to reduce the incidence of complaints.
Implementation Strategy	All incidents and complaints will be documented in an incidents/complaints register. The complaints form will document at least the following information: • Time, date and nature of complaint. • Type of communication (telephone, letter, email, visit). • Name, contact address and contact number (if provided). • Response and investigation undertaken as a result of the complaint. • Action taken and signature of person investigating complaint. Each complaint will be investigated as soon as practicable and, where appropriate, corrective action taken to remedy the cause of the complaint.
Monitoring and Auditing	The CSG fields Environmental Manager will maintain the complaints register and ensure all complaints are resolved. The complaint form will be checked within two weeks of complaint receipt to ensure follow-up action has been taken to resolve the issue.
Reporting and Corrective Action	All complaints and incidents are to be reported to the CSG fields Environmental Manager. The complainant will be advised of what action, if any, has been taken as a result of the complaint. Should further incidents occur or complaints be received in relation to previous occurrences, an appropriate selection of the following corrective actions will be undertaken: • Additional environmental awareness training of the workforce with respect to the procedures to be followed for environmental incidents or complaints. • Investigation into why the incident/complaint was not addressed within the specified time frame. • Incident/complaint follow-up according to the results of the investigation. • Where required, work place practices will be reviewed.

11.16.28 Decommissioning

Element/Issue	Decommissioning
Operational Policy or Management Objective	To restore the decommissioned project sites to be compatible with the surrounding conditions and pre-construction land use as far as practicable.
Performance Criteria	• Agreement reached with landowner regarding final land use. • Rehabilitated sites to be self-sustaining without off-site environmental impacts. • Revegetation re-established similar to surrounding condition or suitable for proposed future land use.
Implementation Strategy	At least five years prior to the decommissioning of each field, a detailed site decommissioning plan will be developed that will establish procedures and methods for decommissioning. The plan will be prepared in consultation with the appropriate regulatory authorities and landholders. Decommissioning procedures will involve: • In consultation with the relevant authorities and the community, assessment of potential future uses of the site based on consideration of the nature of surrounding land uses and the availability of existing infrastructure. • Negotiation with relevant stakeholders regarding the potential for ongoing use of some of the project's infrastructure for future alternative uses. • The demolition of equipment and structures which are of no further economic value and their removal from the site for re-sale, re-cycling or disposal. • Unwanted concrete slabs and roads will be demolished and removed for re-use or disposal. • Phase 1 and 2 contaminated land assessments will be conducted in potentially contaminated areas to standards prescribed by the EP Act. Where necessary, decontamination or site remediation work will be undertaken. • Decommissioned sites will be re-contoured and rehabilitated to achieve a stable self-sustaining land form. When pipelines are no longer required, they will be decommissioned in accordance with the legislative requirements of the day and the Australian Pipeline Industry Association (APIA) Code of Environmental Practice. The most likely options are: • Moth-balling – this involves depressurising the pipelines, capping and filling with an inert gas such as nitrogen and maintaining the cathodic protection system to prevent corrosion as applicable. • Abandonment – this could involve disconnecting the pipelines from all above-ground structures including the cathodic protection systems, purging the pipes of process materials, placing plugs at predetermined intervals to inhibit groundwater flow and removing all above ground facilities. The pipelines will then be abandoned to corrode in-situ. The pipe may be filled with a stable material (e.g. concrete grout) at critical locations such as where it passes under a thoroughfare.
Monitoring and Auditing	A monitoring program that will assess the effectiveness of rehabilitation and decontamination efforts will be developed as part of the preparation of the decommissioning plans. On-going environmental monitoring may be required for a period of time following decommissioning to ensure that it has been successful and there is no likelihood of any further contamination resulting from the site's previous activities.
Reporting and Corrective Action	A final relinquishment report will be prepared and submitted to the relevant authority during the final relinquishment of tenements (ATPs and PLs) that are no longer producing gas nor have any exploratory value. The following constitute incidents or failure to comply: • Decommissioning or rehabilitation not undertaken. • The monitoring program identifies ongoing impacts occurring following rehabilitation. • Complaints received from landowners regarding the rehabilitation. • In the event of an incident or failure to comply, the commitment that has not been undertaken will be reviewed and modifications implemented as appropriate.