

## Section 13

# LNG Facility - Environmental Management Plan

### 13.1 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 have 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 proposed LNG facility on Curtis Island which forms part of the GLNG Project. The EMP has been developed to cover the petroleum activities associated with the construction and operation of the LNG facility that will enable coal seam gas (CSG) to be liquefied for overseas export.

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 LNG facility EMP will be used to support an application for an environmental authority (petroleum activities) for a petroleum facilities licence (PFL) issued under the *Petroleum and Gas (Production & Safety) Act 2004*.

### 13.2 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 LNG facility development will be managed in an environmentally acceptable manner.

## Section 13

# LNG Facility - Environmental Management Plan

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.

### 13.3 Links to EIS

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

A number of other key aspects of construction, operation and decommissioning phases for the LNG facility have been included such as emergency response procedures and incident management.

### 13.4 Legislation

Section 1 of this EIS specifies the legislation and policies controlling the approval process for the GLNG Project. Appendix C provides a list the development approvals required for the GLNG Project including the LNG facility.

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

### 13.5 Santos Environment, Health and Safety Management System (EHSMS)

Santos has a company-wide Environment, Health and Safety Management System (EHSMS) which provides a structured framework for effective environmental and safety practice across all of its activities and operations (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 13.5.1. These standards (where applicable) will apply to the construction and operation of the LNG facility.

## Section 13

## LNG Facility - Environmental Management Plan

Table 13.5.1 EHSMS Management, Hazard and Environment Standards

(Version 3.0 September 2007)

Standard	Title
<b>Management Standards</b>	
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
EHSMS10	Contractor and Supplier Management
EHSMS11	Operations Integrity
EHSMS12	Management of Change
EHSMS13	Emergency Preparedness
EHSMS14	Monitoring, Measuring and Reporting
EHSMS15	Incident and Non-Conformance Investigation, Corrective and Preventative Action
EHSMS16	Management System Audit and Assessment
EHSMS17	Management Review
<b>Environment Hazard Standards</b>	
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

## 13.6 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,

## Section 13

# LNG Facility - Environmental Management Plan

*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 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.

### 13.6.1 Construction Phase

The Construction Environmental Manager will be responsible for the environmental management of the project's construction and for ensuring compliance with the construction components of the EMP for the LNG facility.

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

Compliance audits will be conducted by Santos against the requirements of the EMP, the construction procedures, relevant legislation, license and permit conditions and industry standards.

### 13.6.2 Operational Phase

The LNG Facility Manager will be responsible for ensuring that all environmental commitments are complied with for the operation of the LNG facility. An Environmental Manager will be appointed to be responsible for the day-to-day implementation of the operations components of the EMP and will report on its implementation and performance to the LNG Facility Manager. The Environmental Manager will be supported by the superintendents, process supervisors and shift supervisors who will all be responsible for health, safety and environmental performance of their areas of responsibility.

## 13.7 Monitoring Programs

Monitoring of the LNG facility 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 LNG facility 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.

## 13.8 Reporting and Auditing

Compliance audits will be conducted in accordance with Santos Management Standards EHMS 14 and 16 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

## Section 13

# LNG Facility - Environmental Management Plan

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 phase, internal audits will be undertaken at regular intervals to verify that all work is proceeding in accordance with the EMP; and
- During the operational phase of the LNG facility, internal audits of environmental compliance against statutory approvals will be undertaken on a regular basis.

Section 37 of the EP Act requires that any person who becomes aware of any event that may cause or has caused environmental harm, reports the event/incident to their employer. Details of the nature and circumstances of the event must be provided.

Any environmental incident, hazard, near miss, non-conformance or 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 addition to any other monitoring requirements as part of the required statutory approvals, Santos will report annually to the administering authorities on the petroleum activities undertaken during the previous 12 months.

## 13.9 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.

## 13.10 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 licenses; and

## Section 13

# LNG Facility - Environmental Management Plan

- 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 EMP to achieve continuous improvement in environmental performance.

### 13.11 Description of Relevant Petroleum Tenures

Santos proposes to construct a liquefaction facility and export facility (LNG facility) on Curtis Island, located approximately 6 km north of Gladstone. A high pressure gas transmission pipeline will deliver CSG from the Santos-operated CSG fields at Roma, Fairview and Arcadia Valley to the LNG facility.

The LNG facility will require a petroleum facility licence issued under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act). Section 17 of the P&G (PSA) Act defines a petroleum facility as a - "facility for the distillation, processing, refining, storage or transport of petroleum, other than a distribution pipeline".

Section 3 of this EIS provides a detailed description of the proposed LNG facility. The proposed LNG facility will be located at the Hamilton Point West site adjacent to China Bay on Curtis Island. The area of the site is approximately 200 ha. The LNG facility will consist of:

- A liquefaction facility which includes the on-shore gas liquefaction and storage facilities; and
- Marine facilities which will include a product loading facility, an LNG ship loading facility, and a materials off-loading facility.

A separate EMP has been developed for the marine facilities component of the LNG facility. Refer to section 14 of this EIS.

Section 8 of this EIS provides real property descriptions, the relationship with disturbance types, identifies the topographic features, places and/aspects of potential interest to the administering authorities or other relevant stakeholders.

Section 9 of this EIS identifies all relevant stakeholders and details the consultation process that was undertaken for the LNG facility during the preparation of the EIS.

### 13.12 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 construction and operation of the LNG facility. 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 proposed LNG facility is to be developed in three stages (generally called trains). Construction of the first train (Train 1) is proposed to commence in 2010 with construction taking approximately four years. The LNG facility operations are planned to commence in early 2014. Depending on demand, it is possible that construction of Train 2 could commence as early as 2014 and Train 3 in 2018, which will bring the LNG facility up to its ultimate capacity of 10 million tonnes per annum.

## Section 13

# LNG Facility - Environmental Management Plan

The LNG facility will consist of the following components:

- Inlet Facilities;
- Gas Treatment;
- Gas Liquefaction and Nitrogen Removal;
- Gas Storage Facilities;
- Product Loading Facility; and
- Materials Off-loading Facility.

Section 5 of this EIS provides a detailed waste inventory for the LNG facility. A comprehensive waste management plan (WMP) has been developed that details the proposed source, nature, composition, rate and the immediate or ultimate destination of wastes generated during the construction and operation of the LNG facility. The WMP will be incorporated into this EMP.

### 13.13 Description of Environmental Values, Potential Impacts and Proposed Management Strategies

Section 8 of this EIS provides a detailed description of the environmental values of the LNG facility study site, the potential impacts from the proposed activities, environmental protection objectives and management strategies to mitigate those impacts.

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 13.11, 13.12 and 13.3 of this EMP, this EIS provides appropriate maps, plans and/or aerial photographs to identify the location of the LNG facility, related infrastructure and environmentally sensitive areas.

### 13.14 Rehabilitation Program and Financial Assurance

This EMP incorporates a rehabilitation program and decommissioning plan for the LNG facility. Section 3 and 8 of this EIS outlines the rehabilitation objectives, performance criteria and strategies that will be employed for rehabilitating the areas disturbed during the construction phase of the LNG facility.

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 construction and operation of the LNG facility. The financial assurance

## Section 13

# LNG Facility - Environmental Management Plan

will be calculated using the EPA guidelines and will be regularly reviewed in accordance with any statutory requirements.

### 13.15 LNG Facility Environmental Management Plan Overview

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

- Clearing and Grading;
- Flora;
- Fauna;
- Mosquito;
- Groundwater;
- Surface Water;
- Land Contamination;
- Acid Sulfate Soils;
- Waste;
- Chemical and Dangerous Goods;
- Noise and Vibration;
- Air Quality;
- Cultural Heritage;
- Health and Safety;
- Emergency Response;
- Recruitment and Training;
- Incidents and Complaints; and
- Decommissioning.

### 13.16 Environmental Management Plan

#### 13.16.1 Clearing and Grading

Element/Issue	Clearing and Grading
Operational Policy or Management Objective	To manage the impact of site clearing and disturbance such that: <ul style="list-style-type: none"> <li>• Impacts on vegetation and ecological communities are minimised.</li> <li>• Cleared material is stored appropriately and able to be effectively used during restoration activities.</li> <li>• The rehabilitation success of the disturbed areas is optimised.</li> </ul>
Performance Criteria	<ul style="list-style-type: none"> <li>• Environmental impacts are within authorised limits.</li> </ul>
Implementation Strategy	<ul style="list-style-type: none"> <li>• Clearing and grading will be conducted in accordance with EHS01 (<i>Land Disturbance</i>) and EHS 11 (<i>Indigenous Cultural Heritage Management</i>) and regulatory requirements.</li> <li>• All works will be conducted in accordance with the Queensland Government's operational policy for the removal or disturbance of marine plants in accordance with the <i>Fisheries Act 1994</i> including obtaining the necessary permits to remove, destroy or damage a marine plants.</li> <li>• No clearing of protected vegetation (terrestrial or marine) will occur until appropriate permits have been obtained and will be kept to a minimum.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Clearing and Grading
	<ul style="list-style-type: none"> <li>• All clearing boundaries will be illustrated on construction drawings and clearly marked in the field.</li> <li>• Where practical, trees will be trimmed rather than felled. Individual trees to be retained or preserved on site will be clearly marked in the field, before clearing activities begin.</li> <li>• Topsoil will be graded from the site and stockpiled for use in site landscaping and rehabilitation.</li> <li>• Graded soil will be stockpiled above the flood line, where it can be readily recovered for respreading and where loss through wind or water erosion or other means will be minimised.</li> <li>• 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.</li> <li>• Water trucks will be used (particularly in hot and windy conditions) on access roads and on the site to reduce dust generation.</li> <li>• Vehicle speeds will be restricted on unsealed areas.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with the Santos EHSMS14 (<i>Monitoring, Measuring and Reporting</i>) and EHSMS16 (<i>Management System Audit and Assessment</i>).</p> <p>The entire site will be regularly inspected to assess the effectiveness of the environmental protection measures with particular attention to areas such as clearing demarcation, topsoil and vegetation storage and erosion and sediment control measures. This will be undertaken by the LNG Facility Environmental Manager.</p>
Reporting and Corrective Action	<ul style="list-style-type: none"> <li>• Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</li> <li>• Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS15 (<i>Incident and non-Conformance Investigation, Corrective and Preventative Action</i>).</li> <li>• Non-compliance and incident reports will be closed out by senior management.</li> <li>• Any third party complaints will be recorded in the Santos complaints register (part of the EHSMS) and appropriate corrective actions will be implemented and closed out by the LNG Facility Environmental Manager.</li> </ul>

## 13.16.2 Flora Management

Element/Issue	Flora Management
Operational Policy or Management Objective	To minimise and manage impacts to the terrestrial and marine flora of the site.
Performance criteria	<ul style="list-style-type: none"> <li>• Minimal disturbance of terrestrial and marine flora during construction and operation of the facility and associated infrastructure.</li> <li>• No unplanned or unapproved damage to flora.</li> <li>• Restoration of disturbed areas to equivalent of surrounding area after construction.</li> </ul>
Implementation Strategy	<p><b>Cleared Vegetation</b></p> <p>Areas of vegetation to be cleared during construction will be restricted to the minimum area required and will be clearly delineated.</p> <p>Any clearing involving the removal of expansive stands of woodland vegetation will be undertaken in stages to reduce disruption for fauna dispersal.</p> <p>Cleared vegetation will be chipped and stored for use as mulch during site landscaping works and/or in surrounding vegetated areas susceptible to erosion to the greatest extent practicable. If this is not possible, vegetation will be managed in accordance with EPA guidelines.</p> <p>A program to implement offsetting of cleared vegetation communities will be undertaken as</p>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Flora Management
	<p>required in accordance with legislative criteria for the offsetting of significant vegetation communities. A biodiversity offset strategy and management plan will be developed.</p> <p><b>Access Restrictions</b> Access to the site will be restricted to prohibit unauthorised access to the surrounding undisturbed areas. Access restrictions will be implemented to prevent unauthorised clearing, recreational driving, unmanaged fire regimes, and the spread of introduced weed species.</p> <p><b>Weed Control Program</b> A weed control program will be conducted in accordance with EHS09 (<i>Weed and Pest Animal Control</i>) and will include:</p> <ul style="list-style-type: none"> <li>• Effective management methods to control the spread of declared weed species in keeping with regional management practice and DNRW pest control fact sheets.</li> <li>• Routine monitoring of the construction sites to identify any new incidence of weed infestation.</li> <li>• Provision of information for personnel on the identification of declared weeds.</li> <li>• Washdown protocols for any vehicles/machinery entering and exiting the site.</li> <li>• Procedures for weed eradication and disposal.</li> </ul> <p><b>Clearly Defined Stockpile Areas</b> Stockpile areas and haul roads required during construction will be clearly defined, so that weed establishment and the potential spread of plant diseases may be contained. Stockpiles will be developed in previously cleared areas, with adequate open space buffers, if possible.</p> <p><b>Fire Management Program</b> An appropriate fire management regime will be implemented over the site and will consist of periodic (as appropriate) inspections of fuel load and moisture content in vegetated areas.</p> <p><b>Site Landscape Plan</b> A landscape plan which covers all areas disturbed during construction but not covered by built structures and infrastructure will be prepared and implemented at the end of the construction phase. The landscape plan will include the control of introduced weed species which can colonise disturbed areas following construction and the use of plant species native to the vegetation communities present in the region to the fullest extent possible. It will also guide plantings to 'soften' the facility from a visual amenity perspective.</p>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>) and EHSMS16 (<i>Management System Audit and Assessment</i>).</p> <p>Routine inspections of undisturbed areas by the contractor's environmental representative (during construction) and the LNG Facility Environmental Manager (during operations) will be undertaken to identify any evidence of habitat disturbance or weed presence.</p> <p>Ongoing monitoring will be undertaken to assess the success and integrity of rehabilitation and weed control works.</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (Monitoring, Measuring and Reporting).</p> <p>Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS15 (Incident and non-Conformance Investigation, Corrective and Preventative Action).</p> <p>Non-compliance and incident reports will be closed out by senior management.</p> <p>Any third party complaints will be recorded in the Santos complaints register (part of the EHSMS) and appropriate corrective actions will be implemented and closed out by the LNG Facility Environmental Manager.</p> <p>The LNG Facility Environmental Manager will report any incidents of disturbance or weed infestation to the Construction Manager or the LNG Facility Manager as necessary.</p> <p>The following constitute an incident or failure to comply in regard to flora management:</p> <ul style="list-style-type: none"> <li>• Unauthorised disturbance of vegetation outside the defined construction areas.</li> <li>• Evidence of weed infestation.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Flora Management
	<ul style="list-style-type: none"> <li>• Fire management program not prepared or implemented.</li> <li>• Site landscape plan not prepared or implemented.</li> </ul> <p>In the event of a failure to comply, investigations will be undertaken into the cause of the incident or failure to comply and the appropriate corrective actions taken to overcome the problem and prevent recurrence.</p>

## 13.16.3 Fauna Management

Element/Issue	Fauna Management
Operational Policy or Management Objective	To protect fauna and fauna habitats in areas adjacent to the LNG facility site.
Performance Criteria	<ul style="list-style-type: none"> <li>• Minimal disturbance of terrestrial and marine fauna during construction and operation of the facility and associated infrastructure.</li> <li>• Restoration of disturbed areas to equivalent of surrounding area after construction.</li> <li>• No feral pest species on the site.</li> </ul>
Implementation Strategy	<p>The following strategies will be implemented to minimise potential impacts on fauna and fauna habitats:</p> <ul style="list-style-type: none"> <li>• Bushland and habitat surrounding the site will be managed to prohibit any unauthorised disturbance so as to maintain the area's habitat values.</li> <li>• Access of construction workers to areas outside the designated construction sites will only be permitted with the prior approval of the LNG Facility Environmental Manager.</li> <li>• Where practicable, dead trees, stags and hollow branches will be salvaged from the areas to be cleared for construction and relocated to the surrounding undisturbed areas to create compensatory shelter.</li> <li>• Hollow bearing trees will be felled in a manner which reduces potential for fauna mortality. Felled trees will be inspected after felling and fauna (if identified and readily accessible) will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved over-night to allow animals to move of their own volition.</li> <li>• Management measures will be adopted to minimise impacts to fauna from noise, vibration and lighting.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>) and EHSMS16 (<i>Management System Audit and Assessment</i>).</p> <p>Routine inspections of undisturbed areas by the contractor's environmental representative (during construction) and the LNG Facility Environmental Manager (during operations) will be undertaken to identify any evidence of habitat disturbance or feral pest presence.</p> <p>Ongoing monitoring will be undertaken to assess the success and integrity of rehabilitation and weed control works.</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (Monitoring, Measuring and Reporting).</p> <p>Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in general accordance with the Santos EHSMS15 (Incident and non-Conformance Investigation, Corrective and Preventative Action).</p> <p>Non-compliance and incident reports will be closed out by senior management.</p> <p>Any third party complaints will be recorded in the Santos complaints register (part of the EHSMS) and appropriate corrective actions will be implemented and closed out by the LNG Facility Environmental Manager.</p> <p>The LNG Facility Environmental Manager will report any incidents of feral pest activity to the Construction Manager or the LNG Facility Manager as necessary.</p> <p>The following constitute an incident or failure to comply in regard to fauna management:</p> <ul style="list-style-type: none"> <li>• Unauthorised disturbance of habitat.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Fauna Management
	<ul style="list-style-type: none"> <li>Evidence of feral pest presence.</li> <li>Animal retrieval program not implemented during clearing.</li> <li>Hollow bearing trees not felled appropriately.</li> <li>Failure to obtain a necessary permit.</li> </ul> <p>In the event of an incident or failure to comply, investigations will be undertaken into the cause of the incident or failure to comply and the appropriate corrective actions taken to overcome the problem and prevent recurrence.</p>

## 13.16.4 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 on-site by preventing water from ponding.
Implementation Strategy	<ul style="list-style-type: none"> <li>Mosquito management will be conducted in accordance with EHS09 (<i>Weed and Pest Animal Control</i>).</li> <li>Depressions in the ground surface (such as wheel ruts) will be filled as soon as practicable to prevent the ponding of water.</li> <li>Pools of stagnant water will be drained and/or the depressions filled.</li> <li>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).</li> <li>Erosion and washdown practices will be controlled to prevent the formation of standing water pools in natural water courses.</li> </ul>
Monitoring and Auditing	The LNG Facility Environmental Manager will liaise with Queensland Health and the Gladstone Regional Council for assistance in choosing a suitable method of laticiding/eradication should this be necessary.
Reporting and Corrective Action	<p>The following represent an incident or failure to comply in regard to mosquito management:</p> <ul style="list-style-type: none"> <li>An increase in the numbers of potential mosquito breeding sites on-site.</li> <li>An increase in the numbers of larvae and/or mature mosquitoes on-site.</li> <li>Significant incidences of mosquito bites are reported.</li> <li>Mosquito management strategies are not implemented.</li> </ul> <p>Should an incident or failure to comply occur, a selection of the following actions will be taken:</p> <ul style="list-style-type: none"> <li>An investigation will be undertaken into why directives are not being carried out.</li> <li>Employees will be re-educated on desired practices.</li> <li>Work policies and procedures will be reviewed and modified to improve the situation.</li> </ul>

## 13.16.5 Groundwater Management

Element/Issue	Groundwater Management
Operational Policy or Management Objective	To protect the quality of the existing groundwater resources.
Performance Criteria	<ul style="list-style-type: none"> <li>Groundwater quality will not be impacted by construction activities.</li> <li>Chemical and fuel storage areas will be bunded in accordance with AS 1940 and AS 3780.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Groundwater Management
	<ul style="list-style-type: none"> <li>Compliance with the requirements of the LNG facility's environmental authority.</li> </ul>
Implementation Strategy	<ul style="list-style-type: none"> <li>Activities will be conducted in accordance with HSH08 (Chemical Management and Dangerous Goods) and EHS10 (Management of Water Resources).</li> <li>Fuel, chemical and industrial waste storage areas, workshop areas, vehicle and equipment wash-down areas, and equipment and machinery repair areas will be designed to the appropriate Australian Standards and contain spill cleanup kits as appropriate.</li> <li>All transfers of fuels and oils will be controlled and managed to prevent spillage outside bunded areas.</li> <li>Spills will be reported and immediately contained, removed or remediated as required.</li> <li>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.</li> <li>In the unlikely event that dewatering of foundation excavations is required during construction, the extracted water will be used for dust suppression or disposed of by irrigation.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>), HSH08 (<i>Chemical Management and Dangerous Goods</i>) and environmental authority conditions.</p> <p>The integrity of storage facilities for hazardous materials and wastes and bunded areas will be routinely inspected.</p> <p>A groundwater monitoring program will be implemented in accordance with the conditions of the environmental authority.</p>
Reporting and Corrective Action	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (Monitoring, Measuring and Reporting) and licence conditions.</p> <p>The integrity of storage and management facilities and bunded areas will be routinely inspected.</p> <p>The following is to be classified as an incident or failure to comply in relation to groundwater management:</p> <ul style="list-style-type: none"> <li>Breach in integrity of bunds.</li> <li>Non-compliance with AS 1940 and AS 3780.</li> </ul> <p>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:</p> <ul style="list-style-type: none"> <li>Rectify storage/handling non-compliance.</li> <li>Contain and remediate or dispose of contaminated material/contaminants.</li> <li>Investigate and implement measures to prevent recurrence.</li> </ul>

## 13.16.6 Surface Water Management

Element/Issue	Surface Water Management
Operational Policy or Management Objective	To prevent the release of contaminants that may adversely affect downstream surface water quality, including Port Curtis.
Performance Criteria	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Prevention of direct or indirect release of contaminants resulting from construction operations to surface waters.</li> <li>Minimisation of incidences of accelerated erosion as a result of construction activities.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Compliance with the requirements of the LNG facility's environmental authority.</li> </ul>
Implementation Strategy	Activities will be conducted in accordance with HSH08 ( <i>Chemical Management and Dangerous Goods</i> ) and EHS10 ( <i>Management of Water Resources</i> ).

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Surface Water Management
	<p><b>Construction</b></p> <p>The following strategies will be implemented to minimise potential impacts on receiving surface waters:</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Installation of temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials.</li> <li>• Where appropriate, installation of temporary sediment basins to capture sediment-laden runoff from site.</li> <li>• Stabilise cleared areas not used for plant infrastructure with vegetation or appropriate surface treatments as soon as practicable following earthworks, to minimise erosion.</li> <li>• Provision of appropriate storage areas for fuels and dangerous goods with bunding and spill cleanup kits, and ensuring that relevant construction personnel are trained in appropriate handling of such materials and spill prevention.</li> <li>• Restricting vegetation clearance to the smallest area necessary.</li> <li>• Diversion channels and silt fences will be constructed around the topsoil stockpiles to prevent erosion and loss of topsoil. Seeding of long-term topsoil stockpiles will be carried out with an appropriately designed seed mix to limit stockpile erosion. The topsoil will be respread prior to revegetation of areas to be rehabilitated at completion of construction.</li> <li>• Topsoil stockpiles will be located in areas outside drainage lines, and will be protected from erosion. Prior to the re-spreading of topsoil, the ground surface will be ripped to assist with binding of the soil layers, water penetration, and revegetation.</li> <li>• All fuels and chemicals will be stored and handled in accordance with AS 1940 and AS 3780 to minimise the potential for contamination of stormwater runoff from the site.</li> <li>• Refuelling will occur only within bunded areas.</li> <li>• All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas.</li> <li>• Water used in hydrostatic testing will be disposed in accordance with the environmental authority conditions.</li> <li>• Any site dewatering activities during site excavation works which expose groundwater with higher background levels of dissolved metals will be subject to appropriate treatment or management controls before discharge.</li> <li>• Sewage from the site will be treated to a secondary standard at an on-site sewage treatment plant. Relevant approvals for the plant will be obtained in conjunction with the facility's development approvals. Treated effluent will be loaded into tankers and barged to the mainland for disposal at an existing wastewater treatment plant.</li> </ul> <p><b>Operation</b></p> <p>The site will be divided into different stormwater management catchments according to activity/land-use. Surface water management strategies for each area are listed below.</p> <p><i>Process Area Runoff</i></p> <ul style="list-style-type: none"> <li>• Process areas will be built on bunded concrete slabs. The bunded areas will each have a sump to collect stormwater.</li> <li>• Potentially contaminated stormwater runoff from the process area will pass through a skimmer with the skimmed water/oil being routed to a corrugated plate interceptor oil/water separator unit for removal of oil and grease and suspended solids.</li> <li>• The clean underflow drainage from the skimmer will pass through a “first flush” retention pond with flows in excess of the pond's capacity being bypassed and discharged to the natural drainage system.</li> <li>• The “first flush” pond will be kept empty to ensure that it has adequate capacity for subsequent storm events. Retained pond water will be tested and, if suitable, will be discharged to the natural drainage system; if not (off-spec) it will be pumped to the contaminated water tank for off-site disposal.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Surface Water Management
	<p><i>Fuels and Chemicals Storage Areas</i></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Refuelling will occur only within bunded areas.</li> <li>• All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas.</li> <li>• The bunds will drain into the process area drainage system via suitably sized oil-water separators.</li> <li>• Any hydrocarbon spillage from storage areas, diesel and chemical spills, or industrial waste spills will be contained, reported, and treated/remediated in accordance with appropriate legislative and regulatory agency requirements.</li> </ul> <p><i>General LNG Facility Areas</i></p> <ul style="list-style-type: none"> <li>• The stormwater drainage from the general (non process) facility areas will pass through a “first flush” collection and retention system.</li> <li>• Excess runoff above the “first flush” volume will by-pass the retention system and will be discharge directly into the stormwater outlet system.</li> <li>• 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.</li> <li>• 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.</li> <li>• All stormwater pipes and open drainage channels will be designed in accordance with best-practice engineering principles.</li> </ul> <p><i>Undisturbed Areas</i></p> <ul style="list-style-type: none"> <li>• Undisturbed/ ‘clean’ areas of the LNG facility site will generate stormwater runoff quantity and quality similar to natural runoff. This runoff will be diverted around the process area catchments and be discharged.</li> </ul> <p><i>Sewage</i></p> <ul style="list-style-type: none"> <li>• Sewage from the LNG facility will be treated at an on-site sewage treatment plant. Treatment will include primary and secondary treatment followed by chlorination. Plant effluent will be routed to an irrigation system for disposal.</li> <li>• The irrigation area will be managed to prevent surface runoff and groundwater contamination. It will be fenced and marked with warning notices. Wet weather storage will be provided.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>) and EHSMS16 (<i>Management System Audit and Assessment</i>) and licence conditions.</p> <p><b>Construction</b></p> <p>Monitoring requirements for erosion and sediment control will include routine visual inspections, including following all significant storm events, by the contractor’s environmental representative. Inspections will include the integrity of diversion bunds, drains and storage facilities as well as housekeeping to ensure stormwater runoff does not contain rubbish or contaminants.</p> <p><b>Operation</b></p> <p>A surface water quality monitoring program will be implemented and will include the “first flush” retention ponds. Spillways from the ponds will be designed to allow samples of the pond overflow waters to be collected.</p> <p>All monitoring will be undertaken in accordance with the requirements of the LNG facility’s environmental authority.</p>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Surface Water Management
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</p> <p>Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS15 (<i>Incident and non-Conformance Investigation, Corrective and Preventative Action</i>).</p> <p>Non-compliance and incident reports will be closed out by senior management.</p> <p><b>Construction</b></p> <p>The Construction Environmental Manager will report regularly to the Construction Manager on the following:</p> <ul style="list-style-type: none"> <li>• Contractor's compliance with approved erosion and sediment control plan.</li> <li>• Incidents of erosion or surface water contamination.</li> <li>• Results of routine inspections.</li> </ul> <p><b>Operation</b></p> <p>The LNG Facility Environmental Manager will report significant monitoring results to the LNG Facility Manager.</p> <p>The LNG Facility Environmental Manager will report monitoring results to the EPA in accordance with the LNG facility's environmental authority.</p> <p>The following is to be classified as an incident or failure to comply in relation to surface water management:</p> <ul style="list-style-type: none"> <li>• Monitoring results indicate exceedance of environmental authority limits.</li> <li>• Drainage from bunded areas not contained and managed according to catchment requirements.</li> <li>• Breach in integrity of bunds.</li> <li>• Insufficient housekeeping to prevent general rubbish and contaminants entering the stormwater runoff from the site.</li> </ul> <p>Should an incident or failure to comply occur in relation to stormwater management, a selection of the following corrective actions will be considered where relevant:</p> <ul style="list-style-type: none"> <li>• The cause of any non-compliance with environmental authority limits will be investigated and the problem rectified.</li> <li>• Any breaches in bund integrity will be repaired.</li> <li>• Operational procedures will be modified as necessary to ensure that the drainage and ponding system of each catchment performs as designed.</li> <li>• Repair stormwater controls.</li> <li>• Treat or dispose of contaminated stormwater.</li> <li>• Clean out "first flush" ponds.</li> <li>• Improve level of housekeeping.</li> </ul>

## 13.16.7 Land Contamination

Element/Issue	Land Contamination
Operational Policy or Management Objective	To manage potential soil contamination during the construction of the LNG facility.
Performance Criteria	<ul style="list-style-type: none"> <li>• No contamination of soil.</li> <li>• Spill containment facilities constructed in accordance with AS 1940 (2004) and AS 3780 (1994).</li> </ul>
Implementation Strategy	<p><b>Prevention</b></p> <p>Strategies for the prevention of potential land contamination will include:</p> <ul style="list-style-type: none"> <li>• Construction of appropriate spill containment facilities for all chemicals and fuel</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Land Contamination
	<p>storage areas (in accordance with AS 1940 and AS 3780).</p> <ul style="list-style-type: none"> <li>Workshop areas, chemical stores, fuel tanks, waste disposal/storage areas and other areas providing a potential source of land and groundwater contaminated will be located on hardstand and bunded as required by the appropriate Australian Standards.</li> <li>Establishing and maintaining a hazardous materials register detailing the location and quantities of hazardous substances including their storage, use and disposal.</li> <li>Induction and training of personnel and implementation of safe work practices for minimising the risk of spillage.</li> </ul> <p><b>Containment</b></p> <ul style="list-style-type: none"> <li>If an area of contamination is reported, the cause will be identified and the area of contamination contained. The impact may be contained by isolating the source or implementing controls around the affected site.</li> <li>Hydrocarbon spillage from storage areas, diesel and chemical spills from construction equipment, transport vehicles, and industrial waste spills will be contained, reported, and treated/remediated in accordance with appropriate legislative and regulatory agency requirements.</li> </ul> <p><b>Remediation</b></p> <ul style="list-style-type: none"> <li>Remediation of contaminated land will use the most appropriate available method to achieve required commercial/industrial guideline validation results.</li> <li>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.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</p> <p>The integrity of storage facilities for hazardous materials and wastes and bunded areas will be routinely inspected.</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</p> <p>The Construction Environmental Manager will keep records of routine visual inspections and report any contamination incidents to the Construction Manager.</p> <p>Records will be kept of any activities or incidents that have the potential to result in land contamination. This will include a chemical inventory as well as information on storage location, personnel training and disposal procedures for all chemicals, fuel and other potential contaminants used on site.</p> <p>The following will be classified as an incident or failure to comply in relation to soil contamination management:</p> <ul style="list-style-type: none"> <li>Breach in integrity of bunds.</li> <li>Non-compliance with AS 1940 and AS 3780.</li> </ul> <p>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:</p> <ul style="list-style-type: none"> <li>Rectify storage/handling non-compliance.</li> <li>Contain and remediate or dispose of contaminated material/contaminants.</li> <li>Investigate and implement measures to prevent recurrence.</li> </ul>

## 13.16.8 Acid Sulfate Soil Management

Element/Issue	Acid Sulfate Soil Management
Operational Policy or Management Objective	To control acid generation from the in-situ soils and to minimise the potential for on-site and off-site environmental impacts.
Performance Criteria	<ul style="list-style-type: none"> <li>No net increase in existing soil acidity due to oxidation of in-situ or excavated materials.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Acid Sulfate Soil Management
	<ul style="list-style-type: none"> <li>No direct or indirect release of runoff waters or leachate that do not meet the established water quality parameters.</li> </ul>
Implementation Strategy, Monitoring and Auditing	<p>If potential ASS become exposed during construction, actions will be undertaken in accordance with the requirements of:</p> <ul style="list-style-type: none"> <li><i>Environmental Protection Act 1994.</i></li> <li><i>Environmental Protection (Water) Policy 1997.</i></li> <li>State Planning Policy (SPP2/02) – Planning and Managing Development involving ASS.</li> </ul> <p><b>ASS Management and Treatment</b></p> <p>If ASS material is excavated, the material will be trucked to a designated area and spread out in loose layers approximately 300 mm thick for moisture conditioning and subsequent lime treatment if required. Non-ASS material (residual or alluvial) will be stockpiled separately to estuarine ASS material.</p> <p>Prior to placing the material, a low bund will be constructed around the perimeter of the stockpile to prevent overland flows entering the area and/or to contain runoff or leachate from exiting the treatment area. Bunds will comprise non-ASS materials and will be approximately 0.5 m to 1 m high.</p> <p>The surface of the treatment pad will comprise a layer of imported (non-PASS) fill 0.3-0.5 m thick, compacted to effectively restrict infiltration into the substrate soils.</p> <p>A surface layer of Aglime applied at a rate of 5 kg/m<sup>2</sup> will be worked into the soil surface to act as a guard layer to neutralise any leachate from the materials being treated on the treatment area.</p> <p><b>Lime Treatment of Excavated Material</b></p> <p>Lime will be blended into the material to neutralise any potential acid production. Proposed liming rates will be developed following testing of the material to be treated.</p> <p>Following placement and spreading of material, samples will be obtained for laboratory verification testing. Sample handling and transport will be in accordance with the ASS sampling and analysis guidelines – Ahern et al. (1998).</p> <p>Once the material is sufficiently dry, lime will be added at a rate of 1.5 times the theoretical amount necessary to neutralise the existing and potential acidity.</p> <p>The lime will be blended thoroughly using a rotary hoe, disk plough or other approved alternative method.</p> <p><b>Validation Testing</b></p> <p>Validation testing of the treated material will be carried out by obtaining a representative composite samples for laboratory testing using either the suspended peroxide oxidation-combined acidity and sulfate (SPOCAS) method or combined S<sub>CR</sub> plus acid neutralisation capacity (ANC) test method or other approved testing methods. A total potential acidity (TPA) test result of 0 mols H<sup>+</sup>/t together with an average ANC value of 1.5 times the theoretical amount (of lime) necessary to neutralise the total of any existing and potential acidity, is the target for validation testing.</p> <p>If the testing indicates inadequate treatment, additional lime will be mixed with the soil material and further validation testing will be carried out until satisfactory results are achieved.</p> <p><b>Self-Neutralising Soils</b></p> <p>Some sediments contain naturally occurring calcium or magnesium carbonates in the form of crushed shell (shell-grit) coral and foraminifera, and when present in appreciable quantities, the oxidisable sulphur (%S) levels determined from the SPOCAS or the chromium reducible sulphur (CRS) suite of tests, may be reduced to reflect the self neutralising capability of the sediments. Where appropriate, the SPOCAS or combined CRS plus ANC test methods will be carried out to determine the inherent soil self-neutralising capacity of the sample being tested.</p> <p><b>Other Monitoring</b></p> <p>Monitoring to be undertaken includes:</p> <ul style="list-style-type: none"> <li>Inspection of the bunds around the lime treatment area (should ASS treatment be necessary).</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Acid Sulfate Soil Management
	<ul style="list-style-type: none"> <li>• Inspection of site for evidence indicating the occurrence of untreated ASS.</li> <li>• Water pH in retention ponds.</li> </ul>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</p> <p>The Construction Environmental Manager will report any occurrences of exposed ASS to the Construction Manager and provide regular updates on any ASS treatment.</p> <p>Reports will include:</p> <ul style="list-style-type: none"> <li>• The effectiveness of the operating strategies.</li> <li>• Problems in implementing the ASS management strategies.</li> <li>• Results and compliance with testing requirements, runoff control and materials handling.</li> <li>• Effectiveness of any corrective action adopted.</li> <li>• Deviations from the ASS management strategies.</li> </ul> <p>If lime treatment of PASS is unsuccessful or performance targets are not being met as indicated by the validation and water quality testing procedures, the earthworks schedule will be reassessed and action taken to determine the problems causing the breach of standards. Should results of verification testing indicate residual acidity outside allowable limits, the affected material will remain in place and additional lime added and the verification process repeated until performance criteria are met.</p> <p>If the problems are related to ineffective implementation of the ASS management plan then the plan will be audited to ensure improved implementation. Monitoring and testing will be increased to ensure compliance with the established standards.</p> <p>Any major changes to the management plan will be subject to discussions with and the approval of the relevant regulatory authorities.</p>

## 13.16.9 Waste Management

Element/Issue	Waste Management
Operational Policy or Management Objective	To manage wastes from the construction and operation of the LNG facility in such a way that any potential impacts on the environment are minimised or avoided by incorporating the waste management hierarchy.
Performance Criteria	<p>Prevent adverse environmental impacts from wastes during the construction and operational phases.</p> <p>All activity will be conducted in accordance with EHS04 (<i>Waste Management</i>).</p> <p>Adhere to waste minimisation principles by:</p> <ul style="list-style-type: none"> <li>• Minimising waste generation.</li> <li>• Maximising water and materials reuse and recycling.</li> <li>• Safely treating and disposing of all non-reusable and non-recyclable materials.</li> </ul>
Implementation Strategy	<p><b>Construction</b></p> <p>A waste management plan will be developed for the construction stage that includes elements such as:</p> <ul style="list-style-type: none"> <li>• Environmental values to be protected.</li> <li>• Inputs and outputs of the process, and the impact on the environmental values.</li> <li>• Opportunities and actions to be taken to implement the waste management hierarchy.</li> <li>• Life cycle assessment recommendations.</li> <li>• Specific action plans.</li> <li>• Emergency response procedures.</li> <li>• Training and management.</li> <li>• A monitoring and reporting program.</li> </ul> <p>The following tasks will be undertaken during the construction phase to achieve the</p>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Waste Management
	<p>performance requirement:</p> <ul style="list-style-type: none"> <li>• The construction contractor will prepare a waste management plan for the construction activities.</li> <li>• Topsoil from excavation work will be stripped in layers, and where practicable, stockpiled and reused for contouring, landscaping and rehabilitation.</li> <li>• Tree wastes from site clearing will, where practicable, be chipped and stockpiled for future use in site landscaping and rehabilitation programs.</li> <li>• Careful planning will be employed when ordering materials. Where practical, any excess materials and used chemical containers and packaging will be returned to the supplier or to a local consumer.</li> <li>• Preference will be given to materials that will result in no, or low levels of, waste (from both the materials and the packaging).</li> <li>• Waste streams will be separated into various components where these are produced. Waste separation at source will be achieved by providing bins for re-useable and recyclable materials. For large quantities of waste, an area on site will be allocated for the collection of materials.</li> <li>• Recyclable building wastes will be collected separately and re-used or recycled, e.g.: <ul style="list-style-type: none"> <li>– Timber from concrete formwork can be recovered and reused.</li> <li>– Scrap steel and off-cuts can be recycled.</li> <li>– Plastics can be recycled.</li> <li>– Oils can be collected and sent for refining.</li> </ul> </li> <li>• Wastes that cannot be re-used or recycled will be disposed of at an approved landfill on the mainland.</li> <li>• All wastes leaving the construction site will be tracked in accordance with the requirements of the <i>Environmental Protection (Waste Management) Regulation 2000</i> Schedule 2.</li> </ul> <p><b>Operation</b></p> <p>The waste management plan will be developed prior to commencement of operations and will include:</p> <ul style="list-style-type: none"> <li>• Environmental values to be protected.</li> <li>• Inputs and outputs of the process, and the impact on the environmental values.</li> <li>• Opportunities and actions to be taken to implement the waste management hierarchy.</li> <li>• Life cycle assessment recommendations.</li> <li>• Specific action plans.</li> <li>• Emergency response procedures.</li> <li>• Training and management.</li> <li>• A monitoring and reporting program.</li> </ul> <p>The following tasks will be undertaken to achieve the performance requirements:</p> <ul style="list-style-type: none"> <li>• The LNG Facility Manager will approve the waste management plan for all operational aspects of the LNG facility.</li> <li>• Careful planning will be employed when ordering materials. Where practical, any excess materials and used chemical containers and packaging will be returned to the supplier or to a local consumer.</li> <li>• Preference will be given to materials that will result in no or low levels of waste (from both the materials and packaging).</li> <li>• Waste streams will be separated into various components where these are produced. Waste separation at source will be achieved by providing bins for re-useable or recyclable materials. For large quantities of waste, an area on-site will be allocated for the collection of materials.</li> <li>• Waste storage will occur in a secure area. Should there be a possibility that leaching from wastes onto the ground could affect either groundwater or surface water quality, engineering features will be put in place to prevent this.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Waste Management
	<ul style="list-style-type: none"> <li>• Any wastes that cannot be re-used or recycled will be disposed of at an approved landfill.</li> <li>• All wastes leaving the Facility will be tracked in accordance with the requirements of the <i>Environmental Protection (Waste Management) Regulation 2000</i> Schedule 2.</li> </ul> <p>All site personnel and contractors will implement the waste management hierarchy when undertaking activities on site in the following order of priority:</p> <ul style="list-style-type: none"> <li>• The generation of waste will be prevented or reduced by substituting inputs for those that generate waste; increasing efficiency in the use of raw materials, energy, water or land; redesigning processes or products; and improving maintenance and operation of equipment.</li> <li>• Re-use of waste will be achieved by recovering solvents, metals or oil and re-using these for a secondary purpose.</li> <li>• Wastes will be segregated for recycling into new products. Wastes that can be recycled include glass, cardboard, paper, plastics, aluminium, batteries, oil, drums and rubber.</li> <li>• Energy generated from waste will be recovered and utilised where practicable.</li> <li>• Where appropriate, licensed contractors will dispose of waste, or treat and dispose of waste, in ways that minimise harm to the environment.</li> </ul>
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>) and EHSMS16 (<i>Management System Audit and Assessment</i>).</p> <p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Quantities of waste being sent for reuse, recycling and disposal will be recorded by the construction contractor.</li> <li>• During the construction period, storage areas for wastes, reusable materials and recyclable materials will be monitored by the contractor's environmental representative to ensure materials are removed as required and to minimise potential for cross-contamination of materials.</li> <li>• Waste generation will be audited to assess whether improved practices can be implemented to further reduce the volume of waste disposed to landfill.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Volumes of waste being sent off-site for reuse, recycling and disposal will be monitored regularly via the waste tracking procedures.</li> <li>• Waste materials and reusable and recyclable materials storage areas will be monitored by the Environmental Manager to ensure appropriate disposal contractors are engaged and to ensure materials are removed as required to minimise potential for cross-contamination of materials.</li> <li>• Waste generation will be audited to assess whether improved practices can be implemented to further reduce the volume of waste disposed to landfill.</li> </ul>
Reporting and Corrective Action	<ul style="list-style-type: none"> <li>• Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</li> <li>• Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS15 (<i>Incident and Non-Conformance Investigation, Corrective and Preventative Action</i>).</li> </ul> <p><b>Construction</b></p> <p>The contractor's environmental representative will be responsible for recording and reporting waste management issues, including waste volumes. The contractor will routinely report to the Construction Environmental Manager.</p> <p><b>Operation</b></p> <p>The Environmental Manager will record the results of all waste monitoring surveys and will report waste collection and management issues to the LNG Facility Manager at regular intervals.</p> <p>The following constitute incidents or failures to comply in relation to waste management policies:</p>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Waste Management
	<ul style="list-style-type: none"> <li>• Unnecessary volumes of waste being sent for disposal.</li> <li>• Wastes being disposed of rather than reused or recycled where practicable.</li> <li>• Illegal or uncontrolled waste disposal.</li> <li>• Other non-compliances with the waste management plan.</li> </ul> <p>Should an incident or failure to comply occur, corrective action will be to:</p> <ul style="list-style-type: none"> <li>• Take the necessary actions to identify the causes of non-conformance with the waste management plan performance requirements.</li> <li>• Be responsible for implementing all actions necessary to ensure compliance and prevent recurrence.</li> </ul>

## 13.16.10 Chemical and Dangerous Goods Management

Element/Issue	Chemical and Dangerous Goods Management
Operational Policy or Management Objective	To safely manage, purchase, store, handle and dispose of chemicals and prevent the uncontrolled release of chemicals to the environment.
Performance criteria	<ul style="list-style-type: none"> <li>• Compliance with relevant Australian Standards including: <ul style="list-style-type: none"> <li>– AS 4452 The Storage and Handling of Toxic Substances.</li> <li>– AS 1940 The Storage and Handling of Flammable and Combustible Liquids.</li> <li>– AS 3780 The Storage and Handling of Corrosive Substances.</li> </ul> </li> <li>• No spillages of chemicals or release of chemicals to the environment.</li> <li>• All activity will be conducted in accordance with Santos' HSHS08 (Chemical Management and Dangerous Goods).</li> </ul>
Implementation Strategy	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• All chemicals and dangerous goods to be handled and stored in accordance with relevant Australian Standards.</li> <li>• Material safety data sheets (MSDSs) will be kept in a register at the construction sites.</li> <li>• All hazardous materials will be managed in accordance with the relevant Australian Standard.</li> <li>• Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemical and dangerous goods used on-site. Records will be maintained by the Construction Environmental Manager.</li> <li>• All staff will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods as is relevant to their position.</li> <li>• All construction equipment will be refuelled in an appropriate refuelling facility designed to contain any spills.</li> <li>• Spill containment devices will be available at key chemical storage areas.</li> <li>• Spills will be cleaned up immediately. Contaminated runoff and contaminated soil will be collected and remediated or disposed of in an approved manner.</li> <li>• Where practicable, hazardous chemicals and materials will be replaced with less harmful alternatives.</li> <li>• Procedures regarding emergencies relating to chemicals and dangerous goods will be incorporated into the site emergency plan.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• MSDSs will be kept in a register at the relevant site.</li> <li>• All hazardous materials will be managed in accordance with the relevant Australian Standard.</li> <li>• Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemical and dangerous goods used on-site. Records will be maintained by the Environmental Manager.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Chemical and Dangerous Goods Management
	<ul style="list-style-type: none"> <li>• All staff will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods as is relevant to their position.</li> <li>• Liquid chemicals and fuels stored in above-ground tanks will be banded in accordance with Australian Standards. Packaged goods will be segregated in accordance with Australian Standards.</li> <li>• Spills will be cleaned up immediately. Contaminated runoff and contaminated soil will be collected and remediated or disposed of in an approved manner.</li> <li>• Where practicable, hazardous chemicals and materials will be replaced with less harmful alternatives.</li> <li>• Procedures regarding emergencies relating to chemicals and dangerous goods will be incorporated into the site emergency plan in accordance with EHSMS 13 (<i>Emergency Preparedness</i>).</li> </ul>
Monitoring and Auditing	<p>Regular inspections to ensure that chemical storage facilities meet Australian Standards. Audits will include inspection of dangerous goods storage areas.</p>
Reporting and Corrective Action	<ul style="list-style-type: none"> <li>• Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</li> <li>• Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance vents and third party complaints) will be conducted in accordance with EHSMS15 (<i>Incident and Non-Conformance Investigation, Corrective and Preventative Action</i>).</li> </ul> <p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• The Construction Environmental Manager will record and sign off on routine inspections of chemical and dangerous goods storage and handling areas.</li> <li>• Spills will be reported to the Construction Environmental Manager including actions taken to minimise the impacts.</li> <li>• Should a significant chemical spill occur, the site emergency plan will be followed and the EPA and the local council will be notified as soon as possible.</li> <li>• The Construction Environmental Manager will report to the Construction Manager on the results of inspections, number of staff trained, number of spills and associated corrective actions and preventative actions.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• The Environmental Manager will record and sign off on routine inspections of chemical and dangerous goods storage and handling areas.</li> <li>• Spills will be reported to the Environmental Manager including actions taken to minimise the impacts.</li> </ul> <p>Should a significant chemical spill occur, the site emergency plan will be followed and the EPA and the local council will be notified as soon as practicable.</p> <p>The following constitute an incident or failure to comply in relation to chemical and dangerous goods management:</p> <ul style="list-style-type: none"> <li>• Spills of chemicals or dangerous goods either due to system failures or non-compliance with standard operating procedures.</li> <li>• Uncontained spill of a chemical or dangerous good.</li> <li>• Storage areas not compliant with Australian Standards.</li> </ul> <p>Should an incident/complaint occur, a selection of the following corrective actions will be undertaken as appropriate:</p> <ul style="list-style-type: none"> <li>• Contain and clean up spill material immediately and remediate or appropriately dispose of contaminated material.</li> <li>• Repair bunds / containment facilities.</li> <li>• Relocate chemicals to appropriately designed storage facilities.</li> <li>• In the case of a significant chemical spill, the site emergency plan will be followed and the EPA and the local council will be notified as soon as possible.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

## 13.16.11 Noise and Vibration

Element/Issue	Noise and Vibration
Operational Policy or Management Objective	To prevent excessive noise emissions from construction activities and LNG facility operations.
Performance criteria	All activities will be conducted in accordance with the Santos EHS12 ( <i>Noise Emissions</i> ) and relevant environmental authority conditions.
Implementation Strategy	<p><b>Construction</b></p> <p>The following strategies will be implemented during the construction phase of the LNG facility:</p> <ul style="list-style-type: none"> <li>• Construction work during evening and night-time periods (6.30pm to 6.30am) and on Sundays/Public Holidays will be undertaken in accordance with “best practice” noise management and AS 2436-1981 “<i>Guide to Noise Control on Construction, Maintenance and Demolition Sites</i>”.</li> <li>• Use of the quietest plant and equipment that can economically undertake the work wherever possible.</li> <li>• Regular maintenance of equipment in order to keep it in good working order.</li> <li>• Construction work will occur, wherever possible, within the daytime period.</li> <li>• Adjacent landholders/residents will be notified prior to any atypical noise events outside of daylight hours.</li> <li>• 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.</li> <li>• Utilise existing community consultation framework to provide access to information for the community and maintain positive relations with residents.</li> <li>• Best available work practices will be employed on-site to minimise occupational noise levels.</li> <li>• High efficiency mufflers will be fitted to appropriate construction equipment.</li> <li>• Reversing alarms within construction areas cannot be avoided for safety reasons. Consideration will be given to sourcing so-called “quiet” white-noise alarms whose annoying character diminishes quickly with distance and self-adjusting alarms which adjust emission levels relative to the local background noise level.</li> <li>• Large rocks will be placed in dump trucks not dropped.</li> <li>• Nearby residents will be made aware of the times and duration of the major construction activities. Making residents aware of likely future occurrence of noise significantly reduces annoyance and allows people to make arrangements accordingly.</li> </ul> <p><b>Operation</b></p> <p>Detailed cost-effective mitigation measures will be explored during the detailed design phase of this project. These measures will include the following:</p> <ul style="list-style-type: none"> <li>• The fitting of appropriately designed silencers on both the intake and outlet pipes for the compressors as well as applying appropriate acoustic lagging on the piping.</li> <li>• Acoustic controls to reduce noise emissions from the following areas: <ul style="list-style-type: none"> <li>– Piping noise.</li> <li>– Combustion turbines.</li> <li>– Air-cooled exchangers.</li> <li>– Generators.</li> <li>– Compressors.</li> <li>– Pumps (lean solvent charge pump).</li> <li>– Boil off gas compressor.</li> </ul> </li> <li>• 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.</li> <li>• Once the LNG facility becomes operational, a comprehensive review of noise emissions will</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Noise and Vibration
	<p>be carried out to review the effectiveness of noise control measures.</p> <ul style="list-style-type: none"> <li>• Items of equipment will be specified to comply with the occupational noise level limit of 85 dBA at 1 m.</li> <li>• Items which cannot comply with the 85 dBA specification will be contained in buildings or specially designed acoustic enclosures.</li> <li>• Ducting to and from compressors will be treated to limit noise emissions.</li> <li>• Designs for compressors and blowers will incorporate proprietary acoustic enclosures as necessary.</li> <li>• Best available work practices will be employed on-site to minimise occupational noise levels.</li> </ul>
Monitoring and Auditing	<p><b>Construction</b> Construction equipment will be inspected regularly to maintain optimal working conditions. Throughout construction, the contractor's environmental representative will undertake regular environmental audits.</p> <p><b>Operation</b> Once the LNG facility becomes operational, 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 requirements of the Environmental Protection Policy (EPP(Noise)).</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (Monitoring, Measuring and Reporting). Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with Santos' EHSMS15 (Incident and Non-Conformance Investigation, Corrective and Preventative Action). Non-compliance and incident reports will be closed out by senior management.</p> <p><b>Construction</b> Any noise complaints will be documented in the complaints register, investigated and reported to the Construction Manager by the Construction Environmental Manager.</p> <p><b>Operation</b> The LNG Facility Environmental Manager will maintain records of noise monitoring programs, including any information on the noise levels emitted from individual items of plant and equipment. The LNG Facility Environmental Manager will also record all complaints relating to noise, the results of investigations into these matters and actions taken to resolve these. This information will be reported to the LNG Facility Manager. Noise monitoring results will be reported to the EPA in accordance with the requirements of the project's environmental authority. The following represents an incident or failure to comply in regard to noise management:</p> <ul style="list-style-type: none"> <li>• Noise complaint received.</li> <li>• Non-compliance with conditions of the environmental authority.</li> <li>• Noise management plan is not developed and implemented.</li> <li>• Noise monitoring program not implemented.</li> <li>• Noise management strategies not implemented.</li> </ul> <p>Should a complaint be received, one or more of the following steps will be taken:</p> <ul style="list-style-type: none"> <li>• Activities will be investigated to determine the cause of the problem.</li> <li>• Current procedures and control measures will be reviewed to prevent recurrences and, where necessary, additional control and mitigation measures will be investigated and adopted.</li> <li>• A noise monitoring program will be implemented.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

## 13.16.12 Air Quality

Element/Issue	Air Quality
Operational Policy or Management Objective	To construct and operate the LNG facility in a manner that maintains ambient air quality of the local area in accordance with licence conditions.
Performance Criteria	<p><b>Construction</b></p> <p>No fugitive emissions causing, or likely to cause, an environmental nuisance beyond the boundaries of the LNG facility construction site. These include emissions such as odour, dust, smoke and fumes.</p> <p><b>Operation</b></p> <p>Maintain specified emission concentrations under standard operating conditions.</p> <p>Operate in accordance with the project's environmental authority.</p> <p>All activities will be conducted in accordance with EHS05 (<i>Air Quality</i>).</p>
Implementation Strategy	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Consult with and advise any residents or landholders with the potential to be impacted by temporary construction dust emissions prior the commencement of activities.</li> <li>• Vehicles and machinery will be fitted with appropriate exhaust systems and emission control devices. The devices will be maintained in good working.</li> <li>• 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).</li> <li>• The extent and period of exposure of bare surfaces will be minimised.</li> <li>• Vehicles will be operated in a fuel efficient manner.</li> <li>• Where practical, vegetation clearing or earthworks activities will be rescheduled if necessary to avoid during periods of high wind.</li> <li>• Roads will be appropriately surfaced as soon as possible after the commencement of site activities.</li> <li>• Haul vehicles carrying dusty materials moving outside the construction site will be covered.</li> <li>• Vehicle speeds on site will be limited to minimise the generation of dust on unsealed roads and exposed surfaces.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• The design of the LNG facility has incorporated the use of Best Available Technology Not Entailing Excessive Cost (BATNEEC). In line with this commitment, measures to reduce air quality emissions will include the following: <ul style="list-style-type: none"> <li>– Generation of on-site power using clean methane gas for the LNG facility's electricity requirements to avoid the use of coal-fired power from the Queensland power grid.</li> <li>– Use of dry low-NO<sub>x</sub> technology in refrigeration compressors and power generation turbines to reduce NO<sub>x</sub> emissions.</li> <li>– Incorporation of waste heat recovery units on gas turbine exhausts to provide hot oil for use elsewhere in facility.</li> <li>– Injection of air into flares to produce smokeless flares, thereby reducing particulate matter emissions.</li> <li>– As part of the carbon dioxide removal process, careful selection of solvent to minimise the co-release of methane.</li> <li>– Boil off gas from LNG storage will be used as a fuel rather than flaring to reduce emissions from flares.</li> </ul> </li> <li>• Point-source air emissions will be managed using best practice technology and emission controls.</li> <li>• Stack emission points within the plant will be provided with monitoring ports where necessary.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Air Quality
Monitoring and Auditing	<ul style="list-style-type: none"> <li>• The LNG facility will participate in the Clean and Healthy Air for Gladstone program.</li> </ul> <p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• The vicinity of the facility and associated access areas will be regularly inspected to assess the effectiveness of dust control measures.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Maintenance schedules will be reviewed regularly to ensure that the frequency and durations of breakdowns is minimised.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• A monitoring plan will be developed as part of the environmental licensing of the LNG facility. It is envisaged that the plan will address the following: <ul style="list-style-type: none"> <li>– Meteorological monitoring.</li> <li>– Ambient air contaminant monitoring.</li> <li>– Stack emissions monitoring.</li> <li>– Monitoring to be conducted following the receipt of justifiable complaints.</li> </ul> </li> <li>• Stack testing will be undertaken during the initial operation of the LNG facility to confirm the estimated level of emissions, and subsequently as required by any conditions of the project's environmental authority.</li> </ul>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with EHSMS14 (<i>Monitoring, Measuring and Reporting</i>).</p> <p>Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS15 (<i>Incident and Non-Conformance Investigation, Corrective and Preventative Action</i>).</p> <p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Records of inspections and resulting corrective actions will be maintained.</li> <li>• All justifiable dust complaints will be recorded in the incident/complaint register by the Construction Environmental Manager and will be dealt with in accordance with the provisions of the incidents and complaints procedures.</li> <li>• Significant air quality performance information will be reported to the EPA in accordance with the regulatory requirements.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Records of monitoring results will be kept by the LNG Facility Environmental Manager and reported to the LNG Facility Manager.</li> <li>• Significant air quality issues will be reported to the EPA in accordance with the requirements of the project's environmental authority.</li> </ul> <p>All complaints and breaches of licence conditions will be reported to the LNG Facility Environmental Manager who will advise the LNG Facility Manager and the EPA in line with the project's environmental authority.</p> <p>The following will constitute an incident or failure to comply in regard to air quality management:</p> <ul style="list-style-type: none"> <li>• Emission concentrations exceed environmental authority levels.</li> <li>• Receipt of an air quality complaint.</li> <li>• Dust creating a health and safety issue on site.</li> </ul> <p>The Environmental Manager will ensure that all complaints and possible breaches of authority conditions are investigated, assess site operations to determine the source of the emissions, and identify any significant modifications to activities, processes and control devices that can be made to rectify the problem.</p>

## Section 13

## LNG Facility - Environmental Management Plan

## 13.16.13 Cultural Heritage

Element/Issue	Cultural Heritage
Operational Policy or Management Objective	To protect the cultural heritage values of the LNG facility site.
Performance Criteria	<ul style="list-style-type: none"> <li>Compliance with the requirements of the <i>Aboriginal Cultural Heritage Act 2003</i> and the relevant Cultural Heritage Management Plan (CHMP).</li> <li>No disturbance of any place on the Queensland Heritage Register in accordance with the requirements of the <i>Queensland Heritage Act 1992</i>.</li> </ul>
Implementation Strategy	<ul style="list-style-type: none"> <li>Santos will implement a CHMP in consultation with the relevant Aboriginal Party. Protection, management and mitigation measures will be agreed after cultural heritage surveys are complete, and will be incorporated in the Santos cultural heritage management system.</li> <li>Protection of indigenous cultural heritage will be conducted in accordance with EHS11 (Indigenous Cultural Heritage Management) and agreed Cultural Heritage Management Plans.</li> <li>Where potential non-indigenous heritage material is identified and likely to be disturbed, Santos will 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.</li> <li>Include cultural heritage issues in the project induction program for staff and contractors, and involve representatives from the Aboriginal Parties in the development and implementation of such programs.</li> </ul>
Monitoring and Auditing	<p>Auditing of compliance with the CHMPs in accordance with the processes defined within the CHMP.</p> <p>Auditing of any non-indigenous cultural heritage encountered against the requirements of the conservation management plan.</p>
Reporting and Corrective Action	<p>Any signs of disturbance of artifacts will be reported to the Construction Manager and the relevant indigenous stakeholders.</p> <p>Any of the following will constitute an incident or failure to comply:</p> <ul style="list-style-type: none"> <li>Failure to prepare and/or implement a CHMP or a conservation management plan.</li> <li>Unauthorised disturbance of any artifacts.</li> </ul> <p>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.</p>

## 13.16.14 Social and Community

Element/Issue	Social and Community
Operational Policy or Management Objective	To minimise any social disruption to the local communities from the construction and operation of the LNG facility.
Performance Criteria	No complaints from local communities about the construction or operation of the LNG facility.
Implementation Strategy	<p>To minimise social and community impacts from the project Santos will:</p> <ul style="list-style-type: none"> <li>Provide on-site accommodation for construction workers.</li> <li>Prohibit construction workforce from visiting South End during their roster period. They will be restricted to the project site whilst on the island and will be ferried back to the mainland when they are off roster.</li> <li>Provide a project-specific materials offloading facility adjacent to the facility site to ensure that there will be no disruption to South End residents from the transfer of workforce personnel, plant and equipment to the site.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Social and Community
	<ul style="list-style-type: none"> <li>Develop a social management plan to monitor social impacts associated with the project and work with local services and stakeholders to develop practical solutions.</li> <li>Adopt local procurement policies in order to enhance local economic benefits.</li> <li>Invest in skills development and training in the community.</li> <li>Minimise social impacts on indigenous persons in the project area by the implementation of the Santos Aboriginal Engagement Plan.</li> <li>Contribute to local liveability programs and will initiate a community consultation and awareness campaign to promote project benefits to the community.</li> <li>Continue to consult with local boaters and fishers in the area and monitor issues arising from project activities.</li> <li>Maintain ongoing community engagement activities throughout the construction and operation of the LNG facility.</li> </ul> <p>Should it be built, the access road linking the bridge to the plant site will be limited to project vehicles only, with public access prohibited.</p>
Monitoring and Auditing	Auditing of compliance with the social management plan and the Aboriginal Engagement Plan.
Reporting and Corrective Action	<p>The following will be classified as an incident or failure to comply:</p> <ul style="list-style-type: none"> <li>Failure to prepare or comply with the social management plan or the Aboriginal Engagement Plan.</li> <li>Receipt of complaints from local communities members about the construction or operation of the pipeline.</li> </ul> <p>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.</p>

## 13.16.15 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 construction or operation of the LNG facility.
Performance Criteria	<p>Emergency plans are developed and in place for both construction and operational activities.</p> <p>Compliance with the relevant requirements of:</p> <ul style="list-style-type: none"> <li><i>Dangerous Goods and Safety Management Act 2001.</i></li> <li><i>Fire and rescue Authority Act 1990.</i></li> <li>Santos' EHSMS 13 (<i>Emergency Preparedness</i>).</li> </ul> <p>All personnel familiar with emergency procedures and their role in the event of emergency, and drills undertaken.</p>
Implementation Strategy	<p>Santos will prepare a detailed emergency response plan during the detailed design phase. The plan will include consideration of the following:</p> <ul style="list-style-type: none"> <li>Response procedures in the event of a fire, chemical release, spill, LNG leak, accident, explosion, equipment failure, bomb threat, natural disaster (including bushfire, severe storm and flood events) or any other likely emergency.</li> <li>Communication arrangements and contact details.</li> <li>Roles and responsibilities of responsible personnel.</li> <li>Emergency controls and alarms.</li> <li>Evacuation procedures.</li> <li>Emergency response equipment.</li> <li>Leak detection and control points.</li> <li>Training requirements.</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Emergency Response
	<ul style="list-style-type: none"> <li>Site access and security.</li> </ul>
Monitoring and Auditing	The effectiveness of the emergency response plan will be regularly tested and audited.
Reporting and Corrective Action	<p>Reporting, investigation and management of corrective actions associated with emergency response events (including incidents, hazards, near misses, non-compliance events and third party complaints) will be conducted in accordance with EHSMS 13 (<i>Emergency Preparedness</i>) and EHSMS15 (<i>Incident and Non-Conformance Investigation, Corrective and Preventative Action</i>).</p> <p>Non-compliance and incident reports will be closed out by senior management.</p> <p>The following constitute incidents or failure to comply:</p> <ul style="list-style-type: none"> <li>Emergency response plan is not prepared or implemented.</li> <li>Emergency response equipment is not provided.</li> <li>Emergency response training is not undertaken.</li> <li>Emergency response procedures not followed in the event of an incident.</li> </ul> <p>In the event of an incident or failure to comply, one or more of the following actions will be undertaken as appropriate:</p> <ul style="list-style-type: none"> <li>Prepare or implement the emergency response plan.</li> <li>Provide the necessary equipment or training.</li> <li>Investigate why the emergency response procedures were not followed and implement mitigating measures.</li> </ul>

## 13.16.16 Risk Management

Element/Issue	Risk Management
Operational Policy or Management Objective	To ensure that construction and operation of the LKNG facility poses no unacceptable risks to the local community.
Performance Criteria	<p>The LNG facility will comply with the following legislative requirements:</p> <ul style="list-style-type: none"> <li><i>Maritime Transport and Offshore Facilities Securities Act 2003.</i></li> <li><i>Dangerous Goods Safety Management Act and Regulation 2001.</i></li> <li>Santos' occupational health and safety requirements including EHSMS10-Contractor and Supplier Management.</li> <li>Santos' EHSMS 13 (<i>Emergency Preparedness</i>).</li> </ul>
Implementation Strategy	<ul style="list-style-type: none"> <li>The detailed engineering design of the project will be founded on the basis of industry best practice and regulatory standards.</li> <li>Santos will employ skilled operators for the commissioning and operation of the facility. Specific procedures will be developed for emergency situations and shut-down. Prior to commissioning, a full commissioning safety plan will be developed and operators will be fully trained in this particular plant.</li> <li>Appropriate systems, processes, procedures and skills will be developed to achieve the required performance levels for reliability, availability and integrity.</li> <li>The following security planning will be undertaken for the project: <ul style="list-style-type: none"> <li>Security plans associated with the site will be prepared and updated on a continuing basis and at a minimum, reviewed annually;</li> <li>Security awareness training will be undertaken by all personnel;</li> <li>Security drills and exercises will be scheduled and conducted on at least a yearly basis;</li> <li>All site security facilities will use electronic and solid-state technology and will comply with the relevant Australian Standards; and</li> </ul> </li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Risk Management
	<ul style="list-style-type: none"> <li>– A maritime security plan will be developed for project shipping within Port Curtis.</li> <li>• An integrated safety management system (safety case) will be developed to satisfy the regulatory authorities.</li> <li>• Process safety will be developed and implemented into the LNG facility to protect Santos personnel, contractors, the environment and assets.</li> <li>• The LNG facility will contain a comprehensive fire and gas detection and control system.</li> <li>• The development of emergency planning for the GLNG Project will be continued in consultation with the Department of Emergency Services to ensure rigorous emergency response systems are developed and maintained for the project.</li> </ul>
Monitoring and Auditing	<p>Regular risk and security audits will be undertaken to confirm compliance with risk management requirements.</p> <p>Security drills and exercises will be scheduled and conducted on at least a yearly basis</p>
Reporting and Corrective Action	<p>The results of risk and security audits will be reported to the LNG facility manager and the relevant regulatory agencies.</p> <p>The following would constitute an incident or failure to comply:</p> <ul style="list-style-type: none"> <li>• A recordable incident occurs on site.</li> <li>• Risk or security plans or systems are not prepared or implemented.</li> <li>• Risk management or security awareness training is not undertaken.</li> </ul> <p>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.</p>

## 13.16.17 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 LNG facility.
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	<p>All incidents and complaints will be documented in the Santos Incident Management System (IMS - part of the EHSMS) and will be guided by EHSMS15 (<i>Incident and Non-Conformance Investigation, Corrective and Preventative Action</i>).</p> <p>The complaints form will document at least the following information:</p> <ul style="list-style-type: none"> <li>• Time, date and nature of complaint.</li> <li>• Type of communication (telephone, letter, email, visit).</li> <li>• Name, contact address and contact number (if provided).</li> <li>• Response and investigation undertaken as a result of the complaint.</li> <li>• Action taken and signature of person investigating complaint.</li> </ul> <p>Each complaint will be investigated as soon as practicable and, where appropriate, corrective action taken to remedy the cause of the complaint.</p>
Monitoring and Auditing	The LNG Facility Environment Manager will maintain the IMS complaints register and ensure all complaints are resolved. The complaint form will be checked within two weeks of the complaint being received to ensure that follow-up action has been taken to resolve the issue.
Reporting and Corrective Action	<p>All complaints and incidents are to be reported to senior management.</p> <p>The complainant will be advised of what action, if any, has been taken as a result of the complaint.</p> <p>Should further incidents occur or complaints be received in relation to previous occurrences, an appropriate selection of the following corrective actions will be undertaken:</p> <ul style="list-style-type: none"> <li>• Additional environmental awareness training of the workforce with respect to the</li> </ul>

## Section 13

## LNG Facility - Environmental Management Plan

Element/Issue	Incidents and Complaints
	<p>procedures to be followed for environmental incidents or complaints.</p> <ul style="list-style-type: none"> <li>Investigation into why the incident/complaint was not addressed within the specified time frame.</li> <li>Incident/complaint follow-up according to the results of the investigation.</li> <li>Where required, work place practices will be reviewed.</li> </ul>

## 13.16.18 Decommissioning

Element/Issue	Decommissioning
Operational Policy or Management Objective	To ensure that the LNG facility site is effectively decommissioned in an environmentally sustainable manner.
Performance Criteria	<ul style="list-style-type: none"> <li>The site contains no long term environmental hazards.</li> <li>Risks to the public are mitigated to acceptable levels.</li> <li>The site is returned to a state suitable for other uses in the future.</li> </ul>
Implementation Strategy	<p>At least five years prior to closure of the LNG facility, 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.</p> <p>Decommissioning procedures at the site will involve:</p> <ul style="list-style-type: none"> <li>In consultation with the relevant authorities, assessment of potential future uses of the site based on consideration of the nature of surrounding land uses, the availability of existing infrastructure, and the proximity to Port Curtis.</li> <li>Negotiation with relevant stakeholders regarding the potential for ongoing use of some of the facility's infrastructure for future alternative uses.</li> <li>All services including power, water and telecommunications on the site will be isolated, disconnected and rendered safe.</li> <li>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.</li> <li>Prior to disposal, all wastes will be assessed and classified in accordance with the <i>Environmental Protection (Waste Management) Policy 2000</i> and the <i>Environmental Protection (Waste Management) Regulation 2000</i> (or requirements applicable at that time) and appropriate management procedures will be developed.</li> <li>Phase 1 and 2 contaminated land assessments will be conducted on potentially contaminated parts of the site to standards prescribed by the Environmental Protection Act 1994. Where necessary, decontamination or site remediation work will be undertaken.</li> <li>Undertake environmental monitoring to confirm the success of the decommissioning activities.</li> </ul>
Monitoring and Auditing	<p>A monitoring program that will assess the effectiveness of rehabilitation and decontamination efforts at the site will be developed as part of the preparation of the final decommissioning plan.</p> <p>On-going environmental monitoring will be undertaken for a period of time to ensure decontamination and rehabilitation procedures have been successful and that there is no likelihood of any further contamination resulting from the site's previous activities.</p>
Reporting and Corrective Action	<p>Records will be kept of any areas where decontamination is required.</p> <p>The results of rehabilitation, decontamination and any monitoring programs will be kept and presented in a decommissioning report which will be submitted to the EPA.</p> <p>The following constitute an incident or failure to comply:</p> <ul style="list-style-type: none"> <li>Aspects of the decommissioning, remediation or rehabilitation activities do not satisfy the relevant regulatory authorities or other stakeholders in the project.</li> </ul>

**Section 13****LNG Facility - Environmental Management Plan**

Element/Issue	Decommissioning
	<ul style="list-style-type: none"><li data-bbox="451 315 1334 371">• There is evidence of ongoing environmental harm following the completion of decommissioning activities.</li></ul> <p data-bbox="451 376 1393 432">In the case of the occurrence of the above incidents, the decommissioning plan will be reviewed and revised in consultation with all relevant parties and the situation remedied.</p>