



B5 | Bridge, Road and
Services EMP

Section 15**Bridge, Road and Services Corridor
Environmental Management Plan****15.1 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 (under section 310D of the *Environmental Protection Act 1994* (Queensland) (EP Act)).

EMPs are designed to be dynamic documents, which will be reviewed and revised as the project progresses through the following stages:

- Feedback from regulatory agencies including the Queensland Department of Environment and Resource Management (DERM) and the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA);
- Detailed design;
- Construction;
- Operation; and
- Decommissioning.

It is envisaged that the final EMPs for the necessary environmental authorities will provide more detailed guidance for construction and operational personnel, regulators and stakeholders. The EMPs will contain commitments framed in a way that enables assessment of the extent to which the commitment has been met.

The following five preliminary EMPs have been 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 'stand alone' document, to be used as the basis for actively managing activities as the project progresses.

This preliminary EMP has been prepared based on the findings outlined in Section 3 of the EIS (March, 2009) and additional work undertaken during the preparation of the EIS Supplement. It relates to construction and operation of the bridge, road and services corridor. The EMP has been developed to cover the activities associated with the construction and operation of the bridge, road and services corridor details of which are set out in section 15.11 of this EMP.

This preliminary EMP has been structured in accordance with the Terms of Reference (TOR) for the GLNG Project and to satisfy the requirements of the DERM guidelines and related operational policies as outlined in Table 15.1.1 below. 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.

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Table 15.1.1 EMP Structure

Structure	Description
Element/issue	How elements of the activity (construction or operation) are to be managed (as it affects environmental values).
Operational Policy	The operational policy or management objective that applies to the element.
Performance Criteria	Measurable performance criteria (outcomes) for each element of the operation.
Implementation Strategy	The strategies, tasks or action programs (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria.
Reporting	Format, timing and responsibility for reporting and auditing of monitoring results.
Corrective Action	The action (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for action (including staff authority and responsibility management structure).

This preliminary EMP will be refined and finalised after negotiation as agreed with DERM, then used to support the necessary applications for environmental authorities.

15.2 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;
- A document capable of integration into any EPC contract (which will include obligations to support compliance with the EMP);
- 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 access road and bridge development will be managed in an environmentally acceptable manner.

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

15.3 Links to the EIS

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

A number of other key aspects of construction and operation of the access road and bridge have been included such as fire ant management, emergency response procedures and incident management.

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15.4 Legislation

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

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.

15.5 Santos Environmental Health 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 (see Section 1.2.3.3). The framework has been developed to ensure compliance with AS/NZS ISO 14001:1996 *Environmental Management Systems – Specification with guidance for use* and Australian Standard 4801:2000 *Occupational Health and Safety Management Systems – Specification with guidance for use*.

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

15.6 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 EHSMS

Santos 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.

15.6.1 Construction Phase

The Construction Manager will be responsible for the environmental management of the project's construction and for ensuring compliance with the EMP for the access road and bridge.

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.

15.6.2 Operational Phase

Santos will be responsible for ensuring that all environmental commitments are complied with for the access road and bridge. An Environmental Manager will be appointed to be responsible for the day-to-day implementation of the operations phase of the EMP.

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15.7 Monitoring Programs

Monitoring programs will be undertaken in accordance with this EMP.

Routine environmental monitoring of the access road and bridge 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.

15.8 Reporting and Auditing

Compliance audits will be conducted in accordance with this EMP as well as construction procedures, relevant legislation, license and permit conditions and industry standards.

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

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

- During construction, the contractor will be required to report on environmental compliance on an incident, weekly and monthly basis;
- During construction, internal audits will be undertaken at regular intervals to verify that all work is proceeding in accordance with the EMP;
- A post-construction audit of the access road and bridge right of way and other related infrastructure will be conducted annually for two years following construction to evaluate revegetation, erosion and soil stability, weed control, watercourse alteration prevention and success of bed and bank re-profiling; and
- During the operational phase of the access road and bridge, internal audits of environmental compliance 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 this and recorded in the Incident Management System (IMS), an electronic notification and recording system. All non-conformances lodged are tracked and actioned by nominated personnel, which includes the investigation and implementation of corrective action where required.

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

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

15.9 Training and Communications

All Santos personnel, contractors and visitors are required to undertake appropriate environmental training and induction programs.

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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.

15.10 Review

This EMP will be 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 relevant approval conditions arising from the project's approval and subsequent permits, authorities and/or licenses; and
- Inclusion of any site-specific elements relevant to new developments as they occur during the life of the project.

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

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

15.11 Description of the Proposed Access Road and Bridge

Section 3 of the GLNG EIS provides a detailed description of the access road and bridge. The section includes a description of:

- The type and scale of the proposed construction activities;
- The planned project life identifying construction, operation, decommissioning and rehabilitation phases;
- Activities which may cause environmental harm; and
- Rehabilitation and remediation of environmental harm caused by the construction activities.

The preferred alignment for the access road and bridge is described in Section 3 of the EIS. The proposed alignment was adopted to achieve:

- Minimal impact on port development and potential land use on Curtis Island, by aligning the eastern approaches to the north of Laird Point;
- Minimal footprint over seagrass areas by aligning the western approaches as far north as possible and still achieve the following:
 - Straight horizontal alignment for bridge structure.
 - Non-skewed bridge structure, i.e. bridge aligned perpendicular to tidal flow.

The western approach of the access road to the bridge is across the tidal area north of Landing Road to Friend Point. This alignment was adopted to:

- Minimise the length of the road element over the softer ground conditions; and
- Maximise the area of land on the northern side available for future port related activities.

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The preferred route alignment for the bridge is partially within (eastern end) and partially outside (western end) the State Marine Park which extends to the north along The Narrows.

The bridge will have a two lane precast segmental box girder superstructure on cast in situ pier, pile cap and 1,500 mm diameter bored piles. The span between the piers will be 50-70 m and the total bridge length will be approximately 1.5 km. The bridge will have a vertical clearance of 20.5 m above highest astronomical tide level and 23 m above mid tide level with a horizontal clearance between piers of at least 30 m within the region of the main waterway channel. This clearance envelope has been adopted to allow for the movement of recreational vessels between Port Curtis and The Narrows.

The construction techniques that will be chosen will be determined during by the construction contractor to reflect design and operational requirements, local conditions and any regulatory requirements.

Section 5 of the EIS provides a detailed waste inventory. A comprehensive waste management plan will be 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 access road and bridge. A description of waste management is provided in this EMP.

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

Sections 7 and 8 of the EIS provide a detailed description of the environmental values that occur along the access road and bridge corridor, 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 activity or extend beyond cessation of the 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 15.10 and 15.11 of this EMP, the EIS provides appropriate maps, plans and/or aerial photographs to identify the location of the access road and bridge, related infrastructure and environmentally sensitive areas.

15.13 Rehabilitation Program and Financial Assurance

This EMP incorporates a rehabilitation program and decommissioning plan for the access road and bridge. Sections 3, 7 and 8 of the GLNG EIS outline the rehabilitation objectives, performance criteria and strategies that will be employed for rehabilitating the areas disturbed during the construction phase for the access road and bridge.

The requirement to lodge financial assurance for the access road and bridge will be determined in consultation with the relevant State government agencies. Should financial assurance be required, Santos will calculate the required amount financial assurance for the initial construction of the access road and bridge as part of the application process for the relevant development approvals. The financial assurance will be calculated using the appropriate DERM guidelines and will be reviewed in accordance with any statutory requirements.

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15.14 Access Road and Bridge Environmental Management Plan Overview

The access road and bridge EMP consists of the following construction elements:

- Access;
- Clearing and Grading;
- Earthworks;
- Terrestrial Flora and Fauna Management;
- Marine Flora and Fauna;
- Fire Ant Management;
- Mosquito and Biting Management;
- Weed Management;
- Water Management;
- Land Contamination;
- Acid Sulfate Soils;
- Waste Management;
- Chemical and Dangerous Goods Management;
- Noise and Vibration;
- Air Quality;
- Transport and Traffic Management;
- Cultural Heritage;
- Emergency Response;
- Fire Management; and
- Incidents and Complaints.

15.15 Environmental Management Plan

15.15.1 Access

Element/Issue	Access
Operational Policy or Management Objective	<p>To utilise, to the extent practicable, existing cleared areas and access tracks so as to:</p> <ul style="list-style-type: none"> • Minimise impacts to native flora and fauna. • Minimise impacts to soil and water. • Reduce the likelihood of the spread of weeds and pests. • Minimise the number of access tracks and diversions. • Minimise disruption to third parties. • Manage road and track usage, and achieve satisfactory road and site rehabilitation. • Minimise damage to existing road networks.
Performance Criteria	<ul style="list-style-type: none"> • Access tracks and work areas/sites are readily manageable and able to be rehabilitated using standard techniques. • No unacceptable environmental impacts. • Compliance with relevant environmental authority conditions.

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Element/Issue	Access
Implementation Strategy	<ul style="list-style-type: none"> Site access as well as the locations of laydown and storage areas and additional work areas will be based on the following criteria: <ul style="list-style-type: none"> Avoiding unduly steep or rugged terrain. Minimising impacts on sensitive vegetation, erosion prone soils and watercourse crossings. Avoiding significant remnant or marine vegetation. Existing roads and tracks will be used where practicable. Only designated access tracks will be used by construction vehicles, including personnel vehicles. Public and private access tracks will be reinstated to the pre-construction condition. Workforce education, signage and boundary demarcation will be used to ensure vehicles remain on designated access tracks, within the construction area.
Monitoring and Auditing	Construction areas and associated work areas will be regularly inspected to assess the effectiveness of protection measures with particular attention to erosion and siltation control, topsoil management and waste management.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p> <p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> Management controls not implemented. Off-site environmental impacts occur. <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"> An investigation will be undertaken into why directives are not being carried out. Employees will be re-educated on desired practices. Work policies and procedures will be reviewed and modified to improve the situation.

15.15.2 Clearing and Grading

Element/Issue	Clearing and Grading
Operational Policy or Management Objective	<p>To manage the impact of site clearing and disturbance such that:</p> <ul style="list-style-type: none"> Impacts on both terrestrial and marine vegetation and ecological communities are minimised. Cleared material is stored appropriately and able to be effectively used during restoration activities. The rehabilitation success of the disturbed areas is optimised.
Performance criteria	<ul style="list-style-type: none"> No unplanned or unapproved damage to terrestrial and marine flora and fauna. No unplanned or unapproved damage to flora and fauna. Environmental impacts are within authorised limits. Installation and maintenance of erosion control measures. No accelerated erosion in downstream areas. Soils and vegetation stored appropriately to allow for restoration of disturbed areas to equivalent to surrounding area after construction. Prompt reinstatement of disturbed areas.
Implementation Strategy	<ul style="list-style-type: none"> No clearing of protected vegetation will occur until appropriate permits have been obtained. All clearing boundaries will be illustrated on construction drawings and clearly marked in the field. Clearing will be limited to the minimum area practicable. The following are examples

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Element/Issue	Clearing and Grading
	<p>of how this can be achieved:</p> <ul style="list-style-type: none"> – Having defined limits on the clearing plan; – Delineation of disturbance areas and “no go” areas; and – Implementing access control. <ul style="list-style-type: none"> • Clearing in riparian vegetation will be kept to a minimum required to safely construct the bridge and access road and to meet other environmental requirements (e.g. erosion control, spoil storage). • Where crossings traverse flowing wet watercourses, containment dams will be constructed to isolate work areas. • Blade clearing of trees will occur to retain the root mass. • Cleared vegetation will be removed as merchantable logs, stockpiled onsite or chipped and stored for use as mulch during site landscaping and rehabilitation works and/or in surrounding vegetated areas susceptible to erosion to the greatest extent practicable. Some hollow logs will be stockpiled for use during rehabilitation. • Where practicable, vegetation and soil stockpiles will be located outside watercourses behind the flood line, and away from undisturbed trees or fence lines. • Vegetation and soil stockpiles will be protected against soil loss through wind or water erosion. • Water trucks will be used (particularly in hot and windy conditions) on access roads and on the site to reduce dust generation. • Vehicle speeds will be restricted on unsealed areas. <p>Soil and Erosion Management</p> <ul style="list-style-type: none"> • Install, maintain and monitor erosion and sediment control devices (e.g. berms, silt fences, jute matting) so that ground is stable and vegetation cover is maintained. • Ensure that runoff control devices (e.g. whoaboys) are maintained to prevent erosion. • Carry out excavation works in accordance with the provisions of the construction EMP. • Install sediment fencing around active erosion adjacent to watercourses as needed to keep areas stable. • Remove and stockpile topsoil where excavation or subsidence remediation is to occur. Replace topsoil as soon as practicable after works have finished. • Empty sediment control devices after heavy rain. • If ASS is identified, site specific measures will be implemented as per the construction procedure. • Sediment control devices will be used to preserve stockpiled soils to prevent siltation of any land surface water or blockage of any existing drainage channels. • Where erosion management structures are impacted they will be reinstated as quickly as practicable or alternative structures erected to retain an adequate level of erosion control. <p>To ensure problem soils are avoided where practicable Santos will:</p> <ul style="list-style-type: none"> • Conduct pre-construction soil surveys which should identify problem soil areas that, where practical, should be avoided for locating facilities, access tracks and pipelines. • Use appropriate construction methods for banks to control runoff in sodic soil areas. • Use alternative construction methods where required to avoid exposing the sodic subsoil. • Appropriate controls will be implemented during any diversion of watercourses to minimise the impact of the project on aquatic species. • Measures to minimise the impacts of temporary damming of watercourses for the construction of crossings and obstruction of fish passage will be implemented and include appropriate controls and monitoring during the diversion of watercourses.
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with Section 15.7.</p> <p>The construction site will be regularly inspected to assess the effectiveness of protection measures with particular attention to areas such as clearing demarcation, topsoil and</p>

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Element/Issue	Clearing and Grading
	vegetation storage and erosion, siltation and sediment control measures.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p> <p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> • Vegetation clearing permits not obtained. • Management controls not implemented. • Off-site environmental impacts occur. <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"> • The relevant authority shall be advised if a breach of legislation has occurred. • Clearing permits will be sought. • An investigation will be undertaken into why directives are not being carried out. • Employees will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation. <p>Any third party complaints will be recorded in the Santos complaints register and appropriate corrective actions will be implemented and closed out by the Project Environmental Manager.</p>

15.15.3 Earthworks

Element/Issue	Earthworks
Operational Policy or Management Objective	<p>To manage the impacts of earthworks activities such that:</p> <ul style="list-style-type: none"> • Topsoil quality is protected. • Third party infrastructure is identified and protected. • No off-site environmental impacts from earthworks operations.
Performance criteria	<ul style="list-style-type: none"> • Soils and vegetation stored appropriately to allow for restoration of disturbed areas to equivalent to surrounding area after construction. • Access for authorised third parties maintained. • No unplanned or uncontrolled disturbance to third party infrastructure. • Installation and maintenance of erosion and siltation control and soil containment devices.
Implementation Strategy	<ul style="list-style-type: none"> • The location of the existing third party infrastructure on the site will be accurately identified on construction plans and marked physically on the ground prior to any earthworks activities. • Crossing of infrastructure will be completed in accordance with agreements reached with infrastructure holders. • Earthworks supervisor will instigate the management strategies in the relevant component EMPs for contaminated areas (e.g. dip, waste pit) or acid sulfate soil (ASS) in the event that any such areas are uncovered during earthworks. • Known areas of potential ASS or contamination will be indicated on construction drawings. • Excavated spoil (sub soils) will be stockpiled separately to topsoil and vegetation. • Excavated material will be stockpiled outside watercourses, and/or behind containment structures so as to prevent siltation of any land or surface water or blockage of any existing drainage channels. • Regular gaps and spaces in the topsoil, subsoil and vegetation stockpile will be provided for fauna movement. • The distances between gaps in stockpiles will be reduced at approaches to stream crossings.

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Element/Issue	Earthworks
	<ul style="list-style-type: none"> Any excavations will be left open for the minimum time practicable. Ramps will be installed in the terrestrial excavations to allow the easy egress of fauna. In areas of high fauna density, additional ramps, branches, hessian sacks or similar devices to enable small fauna to exit the trench may be used. Temporary sediment, siltation and erosion control devices will be reinstated when no longer required. Excavations will be constructed to an approved standard to minimise the potential for wall collapse or subsidence. Catchment areas to excavations will be managed to minimise the pooling of water. Pooled water in excavations will be monitored and managed to reduce the potential for wall instability, biting insect breeding areas and contamination.
Monitoring and Auditing	Construction sites will be regularly inspected to assess the effectiveness of protection measures, with particular attention to areas such as soils segregation, and erosion and siltation control devices.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p> <p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> Management controls not implemented. Third party infrastructure is damaged. Off-site environmental impacts occur from earthworks operations. <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"> An investigation will be undertaken into why directives are not being carried out. Employees will be re-educated on desired practices. Work policies and procedures will be reviewed and modified to improve the situation.

15.15.4 Terrestrial Flora and Fauna Management

Element/Issue	Terrestrial Flora and Fauna Management
Operational Policy or Management Objective	To minimise and manage impacts to the ecological values of the construction site and to rehabilitate disturbed areas to as close as practical to the pre-construction condition.
Performance Criteria	<ul style="list-style-type: none"> Minimal disturbance of flora and fauna during construction activities. No unplanned or unapproved disturbance to flora and fauna. Restoration of available disturbed areas to equivalent to surrounding area after construction. Relevant permit is in place before removing any protected species.
Implementation Strategy	<p>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 marine plants.</p> <p>Strategies outlined below will be implemented to minimise potential impacts on flora and fauna:</p> <p>Planning</p> <ul style="list-style-type: none"> A pre-construction vegetation survey will be completed by qualified ecologists in targeted areas of the site to identify for flagging individual significant species and trees that contain hollows that may be avoided during construction. Appropriate permits for the clearing of vegetation, including any marine vegetation, will be obtained prior to the commencement of construction.

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Element/Issue	Terrestrial Flora and Fauna Management
	<ul style="list-style-type: none"> • The location of vegetation to be retained will be clearly indicated on all construction drawings. • Flagging of clearing boundaries though areas of significant vegetation will be completed prior to any clearing activity. <p>Construction</p> <ul style="list-style-type: none"> • Disturbance will generally be restricted to designated work areas. • Physical barriers will be installed around significant vegetation areas in order to unauthorised restrict access and avoid disturbance. • Clearing and excavations works will occur progressively to minimise the length of time the ground is exposed or excavations left open. • Clearing of hollow bearing trees will be avoided as far as possible. • Clearing and disturbance in intertidal areas and wetland/water body areas will be minimised to that necessary construction and safety reasons and to meet environmental requirements (e.g. separation of stockpiles, erosion control). • Removed vegetation will be respread/reused on the site. • Controls to prevent permanent barriers to fish and other fauna movement will be implemented. • Bushland and habitat surrounding construction areas will be managed to prohibit any unauthorised disturbance so as to maintain the area's habitat values as much as possible. • Where practicable, dead trees, stumps and hollow branches will be salvaged from the terrestrial areas to be cleared and relocated to the surrounding undisturbed areas to create compensatory shelter. • Where practicable, the timing of clearing operations will be selected to minimise impacts on breeding species. • 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. • A landscape plan which covers all areas disturbed during construction but not covered by built structures 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. Ongoing maintenance requirements will also be specified. • Rehabilitate any disturbance to beaches and intertidal sand and mudflats to pre-pipeline/bridge conditions.
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with Section 15.7. Ongoing monitoring will be undertaken to assess the success and integrity of construction and ensure appropriate follow-up rehabilitation measures are implemented.</p> <p>Routine inspections of undisturbed areas by the contractor's environmental representative to identify any evidence of habitat disturbance or feral pest presence.</p> <p>The contractor's environmental representative will monitor site clearing to ensure that:</p> <ul style="list-style-type: none"> • Areas to be cleared are clearly defined. • There is no unauthorised disturbance of the surrounding habitat area. • Compensatory shelter is established where necessary. • Where necessary, an animal retrieval program is implemented.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p>

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Element/Issue	Terrestrial Flora and Fauna Management
	<p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> • The pre-construction vegetation survey not undertaken. • Vegetation clearing permits not obtained. • Management controls not implemented. • Unapproved disturbance or impact to flora or fauna. <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"> • The relevant authority shall be advised if a breach of legislation has occurred. • Surveys will be undertaken or permits sought. • An investigation will be undertaken into why directives are not being carried out. • Employees will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation.

15.15.5 Marine Flora and Fauna Management

Element/Issue	Marine Flora and Fauna Management
Operational Policy or Management Objective	To limit impacts to the marine flora and fauna as a result of the GLNG project activities to those areas directly affected.
Performance criteria	<ul style="list-style-type: none"> • No unplanned or unapproved damage to marine flora and fauna. • Restoration of disturbed areas to equivalent of surrounding area after construction.
Implementation Strategy	<p>Strategies outlined below will be implemented to meet the proposed performance criteria for marine flora and fauna:</p> <ul style="list-style-type: none"> • GLNG Project related vessels will abide by the Port of Gladstone speed restrictions and exclusion zones. • A risk assessment of potential marine pest introductions will be carried out for each proposed GLNG Project related vessel. <ul style="list-style-type: none"> – For GLNG Project vessels that are considered high risk, inspections of the hulls and/or hoppers may be carried out, and, for overseas vessels, preferably before they depart for Australian waters. • Santos will promote that all chartered vessels adhere to the International Maritime Organisation's voluntary ballast water management guidelines. • Training for GLNG related vessels to identify large aquatic fauna. • Maintain a lookout for Dugongs, turtles, marine mammals and other large fish whilst sailing in Port Curtis. • Provide training for staff regarding the sensitivity of wetland ecosystems. • A total ban on fishing and crabbing activities being undertaken by any person employed or contracted by GLNG while on the LNG Facility site or associated project areas.
Monitoring and Auditing	<ul style="list-style-type: none"> • Monitoring and auditing will be conducted in accordance with Section 15.7. • Inspections of the site for compliance will occur on a daily, weekly and monthly basis. • Audits will be conducted throughout the project to monitor against this EMP and other licence conditions.
Reporting and Corrective Action	<ul style="list-style-type: none"> • Reporting of environmental performance data will be conducted in accordance with Section 15.8. • 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 managed through the IMS and reported to the appropriate authority as required. • Reporting will occur on an incident, weekly and monthly basis to the appropriate

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Element/Issue	Marine Flora and Fauna Management
	<p>Environmental Manager.</p> <ul style="list-style-type: none"> • Non-compliances, environmental incidents and their corrective actions will be managed through the Environmental Issues Register. • Any third party complaints will be recorded in the Santos complaints register and appropriate corrective actions will be implemented and closed out by the appropriate Environmental Manager.

15.15.6 Fire Ant Management

Element/Issue	Fire Ant Management
Operational Policy or Management Objective	To prevent further spread of the eastern red imported fire ants (RIFA) beyond the Yarwun Fire Ant Restricted Area.
Performance Criteria	No sightings/evidence of fire ants in the project area.
Implementation Strategy	<p>Site Survey</p> <ul style="list-style-type: none"> • A survey of the road construction area on the mainland will be conducted by the Department of Primary Industries and Fisheries (DPIF) within 28 days prior to the commencement of works to ensure that there are no active fire ant nests. • The survey will be signed-off in accordance with the provisions of DPIF Approved Risk Management Plan for the control of risks associated with RIFA. <p>Movement Certification</p> <ul style="list-style-type: none"> • Any high risk items (including fill gained through earthworks) to be transported within the Yarwun restricted area or to a DPIF-approved disposal site will be accompanied by a movement certificate. <p>Vehicle Movements</p> <ul style="list-style-type: none"> • DPIF requirements for the movement of vehicles from the Yarwun restricted area will be followed. Such requirements may include inspection and washdown. <p>Staff Education and Awareness</p> <ul style="list-style-type: none"> • All personnel will be trained in the required practices for fire ant management through a training and awareness program developed in consultation with DPIF.
Monitoring and Auditing	<p>Regular visual inspections will be conducted by the construction contractor in accordance with DPIF guidelines.</p> <p>If there is a suspected fire ant nest, DPIF will be notified within 24 hours and an inspection will occur.</p>
Reporting and Corrective Action	<p>The Environmental Manager will be responsible for enforcing all procedures and policies relating to fire ant management and maintaining all records.</p> <p>Should a Fire Ant nest be found DPIF will be contacted within 24 hours.</p> <p>The following represents an incident or failure to comply:</p> <ul style="list-style-type: none"> • Pre-construction survey not undertaken. • Suspected fire ant nest discovered. • Failure to comply with the DPIF requirements. <p>Should an incident or failure to comply occur, one or more of the following will be taken:</p> <ul style="list-style-type: none"> • Undertake site survey. • Eradicate fire ants in accordance with DPIF requirements. • Modify operations to comply with DPIF requirements.

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15.15.7 Mosquito and Biting Midge Management

Element/Issue	Mosquito and Biting Midge Management
Operational Policy or Management Objective	To prevent the occurrence of potential mosquito and biting midge breeding sites and the presence of adult mosquitoes and biting midges.
Performance criteria	<ul style="list-style-type: none"> • Minimal number of potential mosquito and biting midge breeding sites created.
Implementation Strategy	<ul style="list-style-type: none"> • Mosquito and biting midge management will be prepared in accordance with DERM's Mosquito Management Code of Practice for Queensland which will include the following management measures: <ul style="list-style-type: none"> – Ponding of water in disturbance areas considered capable of supporting significant mosquito breeding will be filled or drained, where practicable. – Pools of stagnant water will be drained and/or the depressions filled. – Storage containers capable of ponding water will be either discarded after use or stored in an inverted position (care will be taken to ensure that ponding does not occur in waste storage areas). – Erosion and washdown practices will be controlled to prevent the formation of standing water pools in natural water courses adjacent to the sites. – Staff will be trained to recognise mosquito and biting midge breeding activity and the treatment of breeding sites. – An assessment of work areas will be undertaken prior to works and on an ongoing informal basis to identify potential breeding sites. – Workforce accommodation facilities to be fitted with protective barriers, such as fly screens and air conditioning. – Insect repellent will be made available to Santos and Contractor personnel as required. – Any required specific area control plans based on assessment of potential breeding sites will conform to the DERM's Mosquito Management Code of Practice for Queensland. – Queensland Health and the Gladstone Regional Council will be contacted for assistance in choosing a suitable method of larviciding / eradication should this be necessary.
Monitoring and Auditing	<p>A record of periodic monitoring of ponding waters and rainwater tanks inspections for mosquitoes and biting midges will be maintained.</p> <p>Areas of ponding and pooled water that cannot be easily removed or backfilled will be inspected regularly for presence of larvae by the Environmental Manager.</p>
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"> • An increase in the numbers of potential mosquito and biting midge breeding sites on-site. • An increase in the numbers of larvae and/or mature mosquitoes and biting midge on-site. • Significant incidences of mosquito and midge bites are reported. • Mosquito and biting midge management strategies are not implemented. <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"> • An investigation will be undertaken into why directives are not being carried out. • Personnel will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation.

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15.15.8 Weed Management

Element/Issue	Weed Management
Operational Policy or Management Objective	To prevent the introduction and spread of weed species associated with any construction activities.
Performance Criteria	<ul style="list-style-type: none"> • No new weed infestation in the construction areas. • No spread of weeds from infested areas to previously weed-free areas. • The construction areas restored to a state that minimises the potential for weed colonisation of disturbed areas.
Implementation Strategy	<ul style="list-style-type: none"> • Prior to the commencement of construction, a weed management plan will be prepared in consultation with the relevant weed management officers of the Department of Employment, Economic Development and Innovations (DEEDI) (formally Primary Industries and Fisheries) and the Gladstone City Council. • All personnel working on the site shall receive at minimum the training as outlined: <ul style="list-style-type: none"> – Basic identifying features of declared weeds; – Weed risk assessment forms and vehicle washdown requirements; – Completion of the DEEDI Weed Hygiene Declaration and vehicle/machinery inspection report; and – Explanation of any quarantine zones and relevant procedures for decontamination that apply. • Work zones that have been identified as containing weeds with 5 km will be subject to the following steps: <ul style="list-style-type: none"> – Complete a risk analysis assessment; and – Keep a copy of all documentation on file at the site office. • A weed inspection of the construction areas will be completed prior to construction and the location of declared plants and other noxious weeds recorded. • Weed control of the construction area and relevant access tracks will be undertaken prior to construction. • Prior to entering the construction site, all vehicles and equipment will be washed at a designated weed washdown area. • All vehicles will be certified and registered as clean before these are permitted access to the construction site. • Access roads to construction areas will be defined to minimise the potential for the spread of weed species and protocols established for washdown of vehicles travelling in and out of the construction areas. • Cleaning procedures will be thorough to remove all soil or organic matter from the surfaces of vehicles, equipment and portable infrastructure, including the undercarriage. Personnel will also ensure all soil and organic matter is removed from clothing and footwear. • Washdown by air or water of a vehicle and/or portable equipment will be supervised by trained personnel and the vehicles details recorded in a vehicle washdown register to be maintained by the construction contractor.
Monitoring and Auditing	The construction site including various work areas and access tracks will be regularly inspected to assess the effectiveness of protection measures with particular attention, to washdown activities and records and restoration activities.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</p> <ul style="list-style-type: none"> • The appropriate Environmental Manager will maintain records of all weed monitoring and control activities. • Non-compliance and incident reports will be reviewed and closed out by the appropriate Environmental Manager. • If weeds are identified in areas previously without weeds, control measures will be undertaken in order to remedy and control.

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15.15.9 Water Quality Management

Element/Issue	Water Management
Operational Policy or Management Objective	<ul style="list-style-type: none"> • To minimise the potential impacts associated with erosion and to prevent the release of contaminants that may adversely affect downstream surface water quality. • To protect the existing water quality values of Port Curtis.
Performance Criteria	<ul style="list-style-type: none"> • No direct or indirect release of contaminants resulting from construction operations to surface waters. • Minimal accelerated erosion as a result of construction activities.
Implementation Strategy	<p>The following strategies will be implemented to minimise potential impacts on receiving surface waters:</p> <ul style="list-style-type: none"> • To minimise potential impacts on receiving surface waters, preparation and implementation of a site-specific construction erosion and sediment control plan in accordance with the Institution of Engineers Australia – Erosion and Sediment Control Guidelines (1996). Management measures described in the ESCP will include: <ul style="list-style-type: none"> – In intertidal areas construction areas will be isolated from tidal inundation by bunds or other suitable means where feasible. – Installation of temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials. – Work associated with the excavation of foundations for the bridge piers will comply with the relevant requirements of the dredge management plan. – Where appropriate, installation of temporary sediment basins to capture sediment-laden runoff from site. – Stabilising cleared areas not used for construction activities with vegetation or appropriate surface treatments as soon as practicable following earthworks, to minimise erosion. – Provision of appropriate bunded storage areas for fuels and dangerous goods in accordance with AS 1940 and AS 3780. – Ensuring that relevant construction personnel are trained in appropriate handling of fuels and dangerous goods and spill prevention. – Refuelling will occur only within bunded areas. – All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas. – Restricting vegetation clearance to the smallest area necessary. – Stripping and stockpiling of topsoil from disturbed areas. Diversion channels and silt fences will be constructed around the topsoil stockpiles to prevent erosion and loss of topsoil. The topsoil will be respread prior to revegetation of areas to be rehabilitated at completion of construction. – 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.
Monitoring and Auditing	<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>

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Element/Issue	Water Management
Reporting and Corrective Action	<p>The Environmental Manager will report regularly to the Construction Manager on the following:</p> <ul style="list-style-type: none"> • Contractor's compliance with approved erosion and sediment control plan. • Incidents of erosion or surface water contamination. • Results of routine inspections. <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"> • Erosion and sediment control plan not prepared and/or implemented. • Drainage from construction areas not contained and managed according to the erosion and sediment control plan. • Breach in integrity of bunds. • Any temporary sediment basins demonstrating significant reduced available volume. • Insufficient housekeeping to prevent general rubbish and contaminants entering the stormwater runoff from the site. <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> <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"> • The cause of any non-compliance with environmental authority limits will be investigated and the problem rectified. • Any breaches in bund integrity will be repaired. • Construction activities will be modified as necessary to ensure that the drainage and ponding system of each catchment performs as designed. • Prepare and/or implement erosion and sediment control plan. • Repair stormwater controls. • Contain and remediate or dispose of contaminated material/contaminants. • Treat or dispose of contaminated stormwater. • Clean out temporary sediment ponds. • Improve level of housekeeping. • Any breaches of approval will be reported to the relevant authority within 72 hours.

15.15.10 Land Contamination

Element/Issue	Land Contamination
Operational Policy or Management Objective	To manage potential soil contamination during the construction of the bridge and access road.
Performance Criteria	<ul style="list-style-type: none"> • No contamination of soil. • Spill containment facilities constructed in accordance with AS 1940 (2004) and AS 3780 (1994).
Implementation Strategy	<p>Sources</p> <p>Prevention of land contamination will be a high priority. Land resources can be affected by contamination which may potentially arise from any of the following:</p> <ul style="list-style-type: none"> • Spillage or leakage of fuels or hazardous materials. • Disposal of waste from construction activities. <p>Prevention</p> <p>Strategies for the prevention of potential land contamination adopted by the construction contractor will include:</p> <ul style="list-style-type: none"> • Avoid the disturbance of any known areas of contamination. If avoidance is not possible, the contaminated material will be excavated and with remediated or disposed of at an approved facility. Work to be undertaken in accordance with DERM

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Element/Issue	Land Contamination
	<p>requirements.</p> <ul style="list-style-type: none"> Construction of appropriate spill containment facilities for all fuel storage areas (in accordance with AS 1940 and AS 3780). Establishing and maintaining a hazardous materials register detailing the location and quantities of hazardous substances including the storage, use and disposal. Induction and training of personnel and implementation of safe work practices for minimising the risk of spillage. <p>Containment</p> <ul style="list-style-type: none"> 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. <p>Remediation</p> <ul style="list-style-type: none"> Remediation of contaminated land will use the most appropriate available method to achieve required commercial/industrial guideline validation results. Validation sampling of any remediated area will be used to establish the site as "clean" as per the relevant DERM Contaminated Land and National Environment Protection Measure (NEPM) Guidelines.
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with Section 15.7.</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 Section 15.8.</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"> Breach in integrity of chemicals storage areas. Non-compliance with AS 1940 and AS 3780. <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"> Rectify storage/handling non-compliance. Contain and remediate or dispose of contaminated material/contaminants. Investigate and implement measures to prevent recurrence.

15.15.11 Acid Sulfate Soils

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	No net increase in existing soil acidity due to oxidation of in-situ or excavated materials. No direct or indirect release of runoff waters or leachate that do not meet the established water quality parameters.
Implementation Strategy	<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"> <i>Environmental Protection Act 1994.</i> Environmental Protection (Water) Policy 1997. State Planning Policy (SPP2/02) – Planning and Managing Development involving ASS. <p>An ASS management plan will be prepared to the satisfaction of DERM prior to construction of the Bridge, Road and Services Corridor, which will include the following:</p> <p>ASS Management and Treatment</p> <p>If ASS material is excavated, the material will be trucked to a designated area and spread</p>

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Element/Issue	Acid Sulfate Soil Management
	<p>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/m² 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>Lime Treatment of Excavated Material</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 <i>et al.</i> (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>Validation Testing</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_{CR} plus acid neutralisation capacity (ANC) test method or other approved testing methods. A total potential acidity (TPA) test result of 0 mols H⁺/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>Self-Neutralising Soils</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>Other Monitoring</p> <p>Monitoring to be undertaken includes:</p> <ul style="list-style-type: none"> • Inspection of the bunds around the lime treatment area (should ASS treatment be necessary). • Inspection of site for evidence indicating the occurrence of untreated ASS. • Water pH in retention ponds.
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with Section 15.7.</p> <p>Monitoring to be undertaken includes:</p> <ul style="list-style-type: none"> • Inspection of the bunds around the lime treatment area (should ASS treatment be necessary). • Inspection of site for evidence indicating the occurrence of untreated ASS. • Water pH in retention ponds.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.7.</p>

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Element/Issue	Acid Sulfate Soil Management
	<p>The 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"> • The effectiveness of the operating strategies. • Problems in implementing the ASS management strategies. • Results and compliance with testing requirements, runoff control and materials handling. • Effectiveness of any corrective action adopted. • Deviations from the ASS management strategies. <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.</p> <p>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>

15.15.12 Waste Management

Element/Issue	Waste Management
Operational Policy or Management Objective	To manage wastes from construction 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.</p> <p>Adhere to waste minimisation principles by:</p> <ul style="list-style-type: none"> • Minimising waste generation. • Maximising water and materials reuse and recycling. • Safely treating and disposing of all non-reusable and non-recyclable materials.
Implementation Strategy	<p>General</p> <ul style="list-style-type: none"> • Waste management plan for specific waste streams will be developed by the construction contractor prior to construction commencing. • General waste will be collected and transported generally to local council approved disposal sites. • Food wastes will be collected, where practicable, considering health and hygiene issues, for disposal off-site. • Refuse containers will be located at each worksite. • Where practical, wastes will be segregated and reused / recycled (e.g. scrap metal). • All personnel will be instructed in project waste management practices and procedures as a component of the environmental induction process. • Suppliers will be requested to minimise packaging where practicable. • A high emphasis will be placed on housekeeping and all work areas will be maintained in a neat and orderly manner. • All equipment and facilities will be maintained in a clean and safe condition. <p>Hazardous Waste</p> <ul style="list-style-type: none"> • Chemical wastes will be collected in 200 litre drums (or similar sealed container), appropriately labelled, for safe transport to an approved chemical waste depot or collection by a liquid waste treatment service. • Storage, transport and handling of all chemicals will be conducted in accordance with

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Element/Issue	Waste Management
	<p>all legislative requirements.</p> <ul style="list-style-type: none"> • Containment bunds and/or sumps will be drained periodically to prevent overflow and subsequent pollution of the surrounding land and/or water body. • All hazardous wastes will be appropriately stored in bunded areas away from watercourses and in accordance with legislative requirements. • Hazardous wastes, such as solvents, rust proofing agents and primer will be managed in accordance with the requirements of relevant legislation and industry standards. • A hazardous materials inventory for the construction period will be prepared. • Material Safety Data Sheets (MSDS) for hazardous materials will be available on-site during construction. • Hydrocarbon wastes, including lube oils, will be collected for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. • All regulated waste will be removed from site by a person who holds a current authority to transport such waste under the provisions of the <i>Environmental Protection Act 1994</i> and sent to a facility licensed to accept such waste. • If a hazardous contaminant is released to waters or land the following steps will be taken: <ul style="list-style-type: none"> – Take immediate action to stop any further release; – Take immediate action to contain the hazardous contaminant to the affected area, taking particular care to protect environmentally sensitive areas; – Restore or rehabilitate the environment to its condition before the release occurred; and – Take necessary action to prevent a recurrence of the release.
Monitoring and Auditing	<p>Monitoring and auditing will be conducted in accordance with Section 15.7.</p> <p>Housekeeping checks to ensure waste is being stored correctly and that no littering is occurring.</p> <p>Construction areas will be inspected after completion to ensure that no waste material remains.</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p> <p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> • Waste management plan not implemented. • Management controls not implemented. • Off-site environmental impacts occur from waste management activities. <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"> • Waste management plan will be prepared. • An investigation will be undertaken into why management controls are not being carried out. • Employees will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation.

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15.15.13 Chemical and Dangerous Goods Management

Element/Issue	Chemical and Dangerous Goods Management
Operational Policy or Management Objective	To ensure that storage and handling of chemicals and dangerous goods on-site does not cause environmental harm or harm to persons.
Performance criteria	<ul style="list-style-type: none"> • No hazardous goods contamination of the environment. • Compliance with AS 1940 and AS 3780.
Implementation Strategy	<ul style="list-style-type: none"> • Spill control procedures will be prepared and personnel trained. • Dangerous goods will be stored and handled as per the requirements of relevant Australian Standards. • Dangerous goods will be stored in bunded areas away from watercourses. • Provision of appropriate bunded storage areas for fuels and dangerous goods in accordance with AS 1940 and AS 3780. • Ensuring that relevant construction personnel are trained in appropriate handling of fuels and dangerous goods and spill prevention. • Refuelling will occur only within bunded areas. • MSDSs for chemicals and dangerous goods will be available on-site. • Waste dangerous goods, which cannot be recycled, will be transported to a designated disposal site as approved by local council. • Spills of dangerous goods will be rendered harmless and collected for treatment and disposal at a designated site, including cleaning materials, absorbents and contaminated soils. • Absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in the correct use. • Protective clothing, appropriate to the materials in use, will be provided. • Relevant permits will be held and conditions of permits met.
Monitoring and Auditing	<p>Regular inspections to ensure that chemical storage facilities continue to meet Australian Standards.</p> <p>Audits will include inspection of dangerous goods storage areas.</p>
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate authority as required.</p> <p>The following represent an incident or failure to comply:</p> <ul style="list-style-type: none"> • Chemicals or dangerous goods not managed in accordance with Australian Standards. • Spill of chemical or dangerous goods occurs. • Off-site environmental impacts occur from management of chemicals or dangerous goods. <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"> • An investigation will be undertaken into why management controls are not being carried out. • Employees will be re-educated on desired practices. • Work policies and procedures will be reviewed and modified to improve the situation.

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15.15.14 Noise and Vibration

Element/Issue	Noise and Vibration
Operational Policy or Management Objective	To prevent excessive noise emissions from construction.
Performance Criteria	<ul style="list-style-type: none"> • All activities will be conducted in accordance with this EMP.
Implementation Strategy	<ul style="list-style-type: none"> • Construction work during evening and night-time periods (6.30 pm to 6.30 am) 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>. • Use of the quietest plant and equipment that can practically and reasonably undertake the work wherever possible. • Maintain equipment in order to keep it in good working order. • Adjacent landholders will be notified prior to any atypical noise events outside of daylight hours. • Operators of construction equipment will be made aware of the potential noise problems and of techniques to minimise noise emission through a continuous process of operator education. • Utilise existing community consultation framework to provide access to information for the community and maintain positive relations with residents. • Best available work practices will be employed on-site to minimise occupational noise levels. • High efficiency mufflers will be fitted to appropriate construction equipment. • 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. • Large rocks will be placed in dump trucks not dropped. • To prevent a startle response from dugong or dolphin at the start of impact piling in deeper water (>3 m) observations will be made of an area (350 m radius initially and 150 m after first day) around the pile before commencement of impact piling on any day or after an extended time when piling has stopped. • If dugong or dolphin is observed within the area then commencement of impact piling will be delayed until they clear the area. Alternatively, a soft start to piling will be considered.
Monitoring and Auditing	Construction equipment will be inspected regularly to maintain optimal working conditions. Throughout construction, the contractor’s environmental representative will undertake regular environmental audits.

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Element/Issue	Noise and Vibration
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</p> <p>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 managed through the IMS and reported to the appropriate authority as required.</p> <p>Non-compliance and incident reports will be closed out by senior management.</p> <p>The following represents an incident or failure to comply in regard to noise management:</p> <ul style="list-style-type: none"> • Noise complaint received. • Noise management strategies not implemented. <p>Should a complaint be received, one or more of the following steps will be taken:</p> <ul style="list-style-type: none"> • Activities will be investigated to determine the cause of the problem. • Current procedures and control measures will be reviewed to prevent recurrences and, where necessary, additional control and mitigation measures will be investigated and adopted. • A noise monitoring program will be implemented.

15.15.15 Air Quality

Element/Issue	Air Quality
Operational Policy or Management Objective	To complete the installation of the bridge and service corridor in a manner that maintains ambient air quality within the local airshed.
Performance criteria	No fugitive emissions causing, or likely to cause, an environmental nuisance beyond the boundaries of the construction site. These include emissions such as odour, dust, smoke and fumes.
Implementation Strategy	<ul style="list-style-type: none"> • Vehicles and machinery will be fitted with appropriate exhaust systems and emission control devices. The devices will be maintained in good working. • Construction sites and access roads will be watered on an as required basis to minimise the potential for environmental nuisance due to dust. Watering frequency will be increased during periods of high risk (e.g. high winds). • The extent and period of exposure of bare surfaces will be minimised. • Vehicles will be operated in a fuel efficient manner. • Open burning of wastes will not be permitted without approval of Construction Manager. • Where practical, vegetation clearing or earthworks activities will be rescheduled if necessary to avoid during periods of high wind and if visible dust is blowing off-site. • Roads will be constructed to minimise dust impacts. • Haul vehicles carrying dusty materials moving outside the construction site will be covered. • Vehicle speeds on site will be limited to minimise the generation of dust on unsealed roads and exposed surfaces.
Monitoring and Auditing	<p>The construction site will be regularly inspected to assess the effectiveness of dust control measures.</p> <p>Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</p>

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Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</p> <p>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 managed through the IMS and reported to the appropriate authority as required.</p> <p>Significant air quality performance information will be reported to the DERM in accordance with the regulatory requirements.</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"> • Receipt of an air quality complaint. • Dust creating a health and safety issue on site. <p>The appropriate 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>
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15.15.16 Transport and Traffic Management

Element/Issue	Traffic Management
Operational Policy or Management Objective	To minimise any potential impacts associated with traffic generated by the project's construction traffic.
Performance Criteria	Traffic-related complaints and incidents investigated within 2 days of receipt.
Implementation Strategy	<p>The following strategies will be implemented to minimise potential impacts from construction related traffic:</p> <p>Santos proposes to enter into an Agreement identifying the likely issues associated with road infrastructure related to the GLNG Project. This agreement will identify the contribution attributable to GLNG for its specific impact on road infrastructure and identify the means of mitigating this impact.</p> <ul style="list-style-type: none"> • All heavy vehicles travelling to and from the site will follow dedicated heavy vehicle routes to avoid built-up areas. • Use of carpooling and bus services will be implemented where practicable to minimise worker trips during the construction. • Where practicable, truck deliveries will be restricted to daytime working hours. • Dangerous goods will be transported along preferred dangerous goods routes in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail and in accordance with the requirements of the Queensland <i>Transport Operations (Road Use Management – Dangerous Goods) Regulation 1998</i> and the <i>Transport Infrastructure Act 1994</i>. • If possible, the transport of oversize loads will be restricted to non-peak periods to minimise traffic disruptions and will be provided with appropriate escorts and approvals from both the Main Roads Department and the Police. • Clear traffic signs and signals will be installed on-site to provide for safe traffic movement. • An on-site speed limit will be enforced. • Limitations will be imposed on marine traffic (recreational boating, fishing etc) around areas of bridge and approaches construction activity.
Monitoring and Auditing	Any incidents or complaints received in relation to project traffic will be managed through the IMS and reported to the appropriate authority as required.
Reporting and Corrective Action	<p>Reporting of environmental performance data will be conducted in accordance with Section 15.8.</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 managed through the IMS and reported to the appropriate</p>

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Element/Issue	Traffic Management
	<p>authority as required.</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 and appropriate corrective actions will be implemented and closed out by the Environmental Manager.</p>

15.15.17 Cultural Heritage

Element/Issue	Cultural Heritage
Operational Policy or Management Objective	To protect the cultural heritage values of the site.
Performance Criteria	<ul style="list-style-type: none"> Compliance with the requirements of the <i>Aboriginal Cultural Heritage Act 2003</i> and the relevant Cultural Heritage Management Plan (CHMP). No disturbance of any place on the Queensland Heritage Register in accordance with the requirements of the <i>Queensland Heritage Act 1992</i>.
Implementation Strategy	<ul style="list-style-type: none"> Santos will implement the Approved CHMP(s) 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. Protection of indigenous cultural heritage will be conducted in accordance with the agreed CHMP(s). 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 DERM and undertake relocation / preservation of the material. A project specific conservation management plan will be prepared to establish mitigation, management and approval procedures. Include cultural heritage issues in the project induction program for staff and contractors, and involve representatives from the Aboriginal Parties in the development and implementation of such programs.
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 during construction activities</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"> Failure to prepare and/or implement a CHMP. Unauthorised disturbance of any artifacts. <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>

15.15.18 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.
Performance Criteria	<p>Emergency response plans are developed and in place.</p> <p>Compliance with the relevant requirements of:</p> <ul style="list-style-type: none"> <i>Dangerous Goods and Safety Management Act 2001</i>. <i>Fire and rescue Authority Act 1990</i>. <p>All personnel familiar with the District Disaster Management Group and their role in the event of a disaster.</p>

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Element/Issue	Emergency Response
Implementation Strategy	<p>Santos will prepare a detailed emergency response plan prior to work commencing. The plan will include consideration of the following:</p> <ul style="list-style-type: none"> Information identifying the obligations under the relevant legislation as well as specific GLNG project Environmental Management Plans. Consultation with Gladstone's emergency response agencies when developing the Emergency Response Plan (ERP). Development of a response, investigation, command, control and recovery for both natural disasters and other disasters/emergencies and incidents. Engagement with QPS and other agencies in Emergency response exercises. Response procedures in the event of a fire, chemical release, spill, accident, explosion, equipment failure, bomb threat, natural disaster (including severe storm, bushfire and flood events) or any other likely emergency. Communication arrangements and contact details. Roles and responsibilities of responsible personnel. Emergency controls and alarms. Evacuation procedures. Emergency response equipment. Leak detection and control points. Training requirements. Site access and security.
Monitoring and Auditing	<p>The effectiveness of the emergency response plan will be regularly tested and audited.</p>
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 managed through the IMS and reported to the appropriate authority as required.</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"> Emergency response plan is not prepared or implemented. Emergency response equipment is not provided. Emergency response training is not undertaken. Emergency response procedures not followed in the event of an incident. <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"> Prepare or implement the emergency response plan. Provide the necessary equipment or training. Investigate why the emergency response procedures were not followed and implement mitigating measures.

15.15.19 Fire Management

Element/Issue	Fire Management
Operational Policy or Management Objective	<p>To prevent the initiation of bushfires as a result of GLNG Project related activities.</p> <p>To protect GLNG personnel and key GLNG Project infrastructure from bushfire and fire impacts.</p>
Performance Criteria	<ul style="list-style-type: none"> Develop and implement emergency response plans that include fire management. No unplanned or uncontrolled fires caused by GLNG Project relative activities. Emergency plans for construction developed and in place prior to activities commencing. All personnel familiar with emergency procedures and their role in the event of emergency, and drills undertaken.

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Element/Issue	Fire Management
Implementation Strategy	<ul style="list-style-type: none"> Minimise fire risk through evaluation processes and management of those risks. Restrict high-risk activities in accordance with local fire bans or in times of high fire danger. Maintain a plan for rapid and co-ordinated response to the outbreak of fire through an established fire response plan in conjunction with the local metropolitan and rural fire brigades. Develop evacuation procedures and hazard reduction. Install building fire detection and alarm systems, emergency lighting, fire hydrants, fire hose reels, fire extinguishers and service checks to relevant specifications as per Australian Standards. Undertake fire safety awareness training as part of site inductions. Conduct fire safety awareness training as part of site inductions. Conduct regular fire drills and record exercises as actions generated. Conduct periodic fire equipment audits. Consult with all relevant fire management authorities.
Monitoring and Auditing	The effectiveness of the fire management component of the emergency response plan will be regularly tested and audited.
Reporting and Corrective Action	<ul style="list-style-type: none"> Extinguish fire if safe to do so. Report all fire events to the Health and Safety Manager. Notify fire brigade and implement evacuation procedure if appropriate. Review fire management plans following fire events. The Health and Safety Manager will be responsible for compiling the results of testing and auditing programs.

15.15.20 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 construction project.
Performance Criteria	Incidents and complaints regarding environmental and social issues will be minimised and mitigation measures implemented to reduce the incidence of complaints. Incident and complaints register established and maintained.
Implementation Strategy	<p>All incidents and complaints will be managed through the IMS and reported to the appropriate authority as required.</p> <p>All incidents and complaints will be documented in an incidents/complaints register. The complaints form will document at least the following information:</p> <ul style="list-style-type: none"> Time, date and nature of complaint. Type of communication (telephone, letter, email, visit). Name, contact address and contact number (if provided). Response and investigation undertaken as a result of the complaint. Action taken and signature of person investigating complaint. <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 appropriate Environment Manager will maintain the IMS complaints register and ensure all complaints are resolved. The complaint form will be checked within two weeks of complaint receipt to ensure follow-up action has been taken to resolve the issue.
Reporting and Corrective Action	<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>

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Element/Issue	Incidents and Complaints
	<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">• Additional environmental awareness training of the workforce with respect to the procedures to be followed for environmental incidents or complaints.• Investigation into why the incident/complaint was not addressed within the specified time frame.• Incident/complaint follow-up according to the results of the investigation.• Where required, work place practices will be reviewed.