6.16 Rehabilitation and Decommissioning

6.16.1 Introduction

The coal seam gas (CSG) field stages as outlined in Section 3.6.3 include:

- Exploration;
- Appraisal;
- Development;
- Production/Operation; and
- Rehabilitation and Decommissioning.

Rehabilitation of the CSG fields will be undertaken progressively over the life of the project and in accordance with both regulatory agency requirements (e.g. environmental authority conditions) and landholder requirements.

This section expands on the information provided in Section 3.6.7 and outlines rehabilitation and decommissioning processes for the various components of the CSG fields throughout the life of the project.

6.16.2 Regulatory Framework

The rehabilitation and decommissioning of the CSG fields will be undertaken in accordance with the following:

- *Petroleum and Gas (Production and Safety) Act 2004* (Qld);
- *Petroleum Act 1923* (Qld);
- *Environmental Protection Act 1994* (Qld);
- *Environmental Protection (Waste Management) Policy 2000* (Qld); and
- *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998).*

6.16.2.1 Petroleum and Gas (Production and Safety) Act 2004

The *Petroleum and Gas (Production and Safety) Act* (P&G (PSA) Act) regulates petroleum and natural gas in Queensland. It aims to facilitate and regulate the carrying out of responsible petroleum activities and the development of a safe, efficient and viable petroleum and fuel gas industry. It aims to achieve this in a way that minimises land use conflicts and encourages responsible land use management (among other measures).

6.16.2.2 Petroleum Act 1923

The Petroleum Act regulates petroleum and natural gas in Queensland in relation to certain petroleum tenements granted prior to 2004. The Petroleum Act deals with authorities to prospect and leases, and provides for the ownership and pipelines and equipment.

6.16.2.3 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (Qld) (EP Act) aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (being ecologically sustainable development). Environmental authority conditions relating to rehabilitation and decommissioning will be complied with.

6.16.2.4 Environmental Protection (Waste Management) Policy 2000

The *Environmental Protection (Waste Management) Policy 2000* (Qld) (EPP Waste) aims to achieve the object of the EP Act in relation to waste management by identifying environmental values to be enhanced or protected, providing a framework for the making of consistent and fair decisions in relation to waste management and minimisation, providing for the preparation of waste management programs and industry waste reduction programs and providing for government planning for waste management. Legislative amendments to the EPP Waste that took effect on 1 January 2009 were considered during preparation of this EIS.

6.16.2.5 Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998)

The assessment and management of contaminated or potentially contaminated land is governed by the EP Act, administered by the Environmental Protection Agency (EPA). Assessment is also guided by the (former) Department of Environment's *Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland,* dated May 1998 (DoE, 1998) which outlines assessment criteria (environmental investigation levels) and the tiered assessment approach.

6.16.3 Rehabilitation

All rehabilitation works will be undertaken in accordance with existing EPA and industry guidelines which outline specific goals, measures, objectives and performance criteria to determine when rehabilitation is complete.

6.16.3.1 Goals

The specific goals for rehabilitating the CSG fields are as follows:

- **Achievement of acceptable land use suitability** - Rehabilitation will aim to create a stable landform with a post-project land use capability and/or suitability similar to that prior to disturbance, unless other beneficial land uses are pre-determined and agreed;
- **Creation of stable landform** - The CSG fields will be rehabilitated to a safe condition that is self-sustaining or to a safe condition where maintenance requirements are consistent with an agreed post-project land use; and
- **Preservation of downstream water quality** - Surface and ground waters that leave the CSG fields will meet accepted closure criteria. Current and future water quality will be maintained at levels that are acceptable for users downstream of the site.

Objectives, indicators and closure criteria will be developed for each of these goals in a closure plan that will be prepared in consultation with the appropriate stakeholders prior to the site closure.

6.16.3.2 Rehabilitation Strategy

Progressive rehabilitation will be undertaken for all petroleum activities where practicable. Surrendering of any petroleum Environmental Authority's (EA's) will be undertaken in accordance with the relevant regulatory requirements (e.g. Section's 142 and 143 of the EP Act) and will include landholder sign-off where necessary (e.g. where assets are to be transferred from Santos to the landholder).

6.16.3.3 Success Criteria

To ensure Santos has complied with EPA approvals and that rehabilitation of the CSG fields has been conducted to satisfactory levels, Santos will lodge a "Financial Assurance" form with the EPA. A financial assurance is "*a security held to ensure compliance with the conditions of an environmental authority and to meet any costs or expenses (or likely costs or expenses) incurred by the administering authority in*

taking action to prevent or minimise environmental harm or rehabilitate or restore the environment in relation to the activity for which financial assurance has been given" (EPA, 2008).

During the final relinquishment of tenements (ATPs and PLs) that are no longer producing gas nor have any exploratory value, a final relinquishment report will be required. This report will detail all petroleum activities that occurred, what remedial works where conducted, and the status of the final land use. Prior to relinquishment, Santos takes steps to ensure affected landowners are satisfied with the standard of site rehabilitation undertaken by Santos. In addition, the administrating authority must be satisfied with the standard of rehabilitation before Santos can relinquish the tenement.

6.16.3.4 Well Leases

During the development of the CSG fields, activities require the well lease to be a sufficient size to allow drilling rig access and for a safe work area (refer to Sections 3.6.3.2 and 3.6.3.3 for further details). Once the well is converted from an appraisal well to a production well, the area required is significantly reduced. This excess area will be rehabilitated as part of the well conversion. This rehabilitation will involve the removal of drilling infrastructure such as sumps and pits, re-contouring and rehabilitating the area consistent with the surrounding land, and revegetating the disturbed surface to stabilise it against erosion. The remaining production well lease will be fenced to exclude livestock.

All infrastructure on the site will be removed and disposed off-site according to the waste hierarchy. The site will then be tested for any potential contamination and remediated as necessary. Rehabilitation of the area will occur as soon as practical. Rehabilitation will occur in consultation with the relevant landholder and will generally involve surface contouring, respreading topsoil, respreading vegetation and reseeding. The determination of any site specific rehabilitation criteria will be influenced by the original land use and the landholder requirements. Typically the lease site will be seeded with native grass or other approved species.

Project infrastructure in some instances may be retained by the landholder, e.g. gas wells for conversion to water wells. Any transfer of ownership of project infrastructure to a landholder will be occur in accordance with the relevant petroleum authority, Environmental Approval (EA) and any other applicable legislation.

6.16.3.5 Access Roads and Tracks

Access roads or tracks (refer to Section 3.6.6.1 for further details) within a decommissioned CSG field that are not required by the landholder will be removed and revegetated to be consistent with the surrounding land use. The road/track will be rehabilitated to ensure that areas of compaction were lightly ripped to allow natural revegetation. Erosion controls and stormwater management will also be installed, where required, to minimise soil erosion and potential sedimentation of nearby watercourses. The area may also be seeded with a suitable native grass species, depending on the location of the access road/track. If a request is made by a landholder or other third party (e.g. local council) to leave the road for continued use, the road may undergo some remediation works (if required) before being handed over to the landholder or other third party. Santos' responsibility for road maintenance will cease upon transfer to a third party.

6.16.3.6 Pipelines (Gas and Water)

During the construction phase of the CSG fields, pipelines will be required to transport associated water to management ponds. Initially during appraisal works these water pipelines may be placed on the ground surface, however as the field is developed these water pipelines will be buried at the time of the installation of the underground gas pipelines (refer to Section 6.3.1 for further details). The area that is disturbed during this process will be rehabilitated in a similar manner to the well leases, with surface contouring, respreading topsoil, respreading vegetation and reseeding occurring.

6.16.3.7 Water Management Ponds

Rehabilitation of areas disturbed during the construction of water management ponds (refer to Section 3.6.5 for details on water management ponds) will include seeding of pond walls and installation and monitoring of erosion control devices to ensure sound management of the site during operation. In addition, consideration of final rehabilitation and decommissioning will be integrated into the initial design process.

6.16.3.8 Borrow Pits

Borrow pits are required not only for the construction phase of the CSG field development but also for the operational phase (refer to Section 3.6.6.3 for further details on borrow pits). While most use of borrow pits will be during the construction phase of the development, access to borrow pits will still be required during the operational phase as part of maintenance of roads, well leases, pipelines and other areas.

All borrow pits will be constructed to ensure that the top layer of the soil profile is removed and stockpiled in a manner that will preserve its biological and chemical properties, and can also be used for rehabilitation purposes. All borrow pits will be constructed to enable effective restoration consistent with the surrounding land use.

6.16.3.9 Other Disturbance Areas

As part of the development of the CSG fields there will be a need for supporting infrastructure. This can include, but will not be limited to, workers accommodation, administration buildings, and laydown and storage areas. The installation of workers accommodation and administration buildings will be on a temporary basis, with most buildings being demountables.

Rehabilitation will occur in consultation with the relevant landholder and will generally involve removal of all aboveground infrastructure, surface re-contouring, respreading topsoil, respreading vegetation and reseeding. The determination of any site specific rehabilitation criteria will be influenced by the original land use and the requirements of the landholder or other relevant third parties.

6.16.4 Decommissioning

The process of decommissioning a CSG field is regulated by the *Petroleum and Gas (Production and Safety) Act 2004* and the *Petroleum Act 1923* which requires petroleum infrastructure to be removed from active service and left in a manner that is safe. This process is known as final relinquishment and results in the tenement being surrendered to the Queensland Government.

6.16.4.1 Well Leases

Decommissioning of the production well will be undertaken when the well is no longer required for the project. The requirements for how a well is to be decommissioned, also referred to as “plugging and abandonment”, are detailed in the *Petroleum and Gas (Safety and Production) Regulation 2004*. This process requires the hole to be filled with cement grout to ensure that no contamination occurs, with the responsible person having to lodge a notice to the Department of Mines and Energy about the decommissioning.

6.16.4.2 Pipelines (Gas and Water)

The process of pipeline decommissioning is discussed in Section 7.16.4. A similar process will be used for the decommissioning of smaller in-field gas and water pipelines.

6.16.4.3 Water Management Ponds

If the water management ponds are not required by the landholder or other third party, they will be decommissioned. Any remaining water in the ponds will be treated using existing water management

facilities. Any remaining sediment or sludge will be tested, remediated and disposed of in accordance with the standards prescribed by the *Environmental Protection Act 1994* (EP Act) or any other legislation applicable at the time.

The ponds once empty may:

- Be returned to the landholder complete with HDPE liner (once cleaned);
- Have the liner removed and the pond returned to the landholder;
- Have the pond modified to become a water harvesting structure; or
- Be completely removed and the land rehabilitated.

Refer to Appendix C of Appendix Q for further details.

6.16.4.4 Compressor Stations

All items of equipment (refer to Section 3.6.2.1 for further details) to be decommissioned will be de-oiled, degassed, depressurised and isolated and decontaminated. This may involve flushing all process equipment and associated pipework with water. This water will be disposed of as per the decommissioning plan developed in conjunction with the regulatory authorities. All hazardous materials will be removed from the site in accordance with the handling and transportation requirements applicable at the time.

All buildings and infrastructure, including administration buildings, workshops, and fixed plant will be demolished and removed from the site. Where possible, assets may be re-used or sold.

The remaining items will be demolished and removed/transported from the site as required. All recoverable scrap steel will be sold and/or recycled, with the remaining non-recyclable wastes being disposed to a licensed landfill.

Prior to disposal, all wastes will be assessed and classified in accordance with the *Environmental Protection (Waste Management) Policy 2000* and the *Environmental Protection (Waste Management) Regulation 2000* and appropriate management procedures developed.

All concrete footings and pads will be broken up to at least 1.5 metres below the surface. The waste concrete will be crushed to produce an aggregate that can either be used on the site or sold for some other beneficial reuse.

Sediment ponds and sumps will be drained, decontaminated, backfilled, topsoiled and revegetated. Any stormwater management ponds present at the time of decommissioning will be used to assist with the provision of water for rehabilitation, where necessary.

During operation the potential exists for land to become contaminated from compressor station activities as a result of any of the following:

- Malfunction of sewage treatment facilities;
- Poor management of general and regulated wastes; and
- Spills and/or leakage of hydrocarbons and other chemicals.

Facility design will make provisions to minimise contamination through use of spill trays and purpose built facilities for handling of expected contaminants; e.g. ergonomic filtration changeout.

Upon decommissioning, Phase 1 (and 2 as necessary) contaminated land assessments will be conducted in potentially contaminated areas to standards prescribed by the EP Act, Draft Guideline for the Assessment and Management of Contaminated Land in Queensland (note this policy is still evolving) and/or other legislation applicable at the time. Contaminated areas will be assessed for the type and amount of contaminants. Areas that have elevated levels of contaminants will be remediated using suitable methods as they become available during the life of the project. Depending on the future land use and as necessary, the top 0.5 metres of soil at all fuel storage areas will be remediated. In addition, any hazardous materials and wastes will be removed from site or remediated. Remediation measures will

be discussed with the EPA prior to commencement of remediation works. Such measures could include bio-remediation on-site or disposal off-site at a licensed facility.

6.16.5 Borrow Pits

All decommissioned borrow pits will be recontoured to match the surrounding drainage system. The stockpiled topsoil will be respread over the area and the surface stabilised against erosion by revegetating or other suitable means. Stormwater and erosion management systems will also be installed as required.

6.16.6 Other Disturbance Areas

Upon decommissioning, all sites will be tested for any potential contamination and rehabilitation of the area will occur as soon as practical.