Rehabilitation Progress Update
– Project Overview

14 November 2012
Overview

- Pilliga State Forest
- Background
- Initial clean up work
- Compliance issues
- Rehabilitation Plan
  - Dieback
  - Excess Ponds
  - Lease Site Rehabilitation
  - Well Plugging and Abandonment
- Future work plans
- Summary of work
Pilliga State Forest
Pilliga State Forest

- The Pilliga Forest comprises 500,000 hectares (3000 sq.km) between Narrabri and Coonabarabran.

- Gas exploration activities have occurred in the Pilliga since the 1960s.

- In 2005, the NSW Government assessed the entire Pilliga area.

- The area reserved under the National Parks Act was more than doubled to about half the Pilliga.

- The other half was set aside by the Government as State Forest “to ensure the long-term sustainability of the region's important timber, gas, minerals and apiary sectors”.

- The northeast Pilliga, where Santos’ operations are located, was specifically identified as an area where a gas industry was likely to be developed.

- It is estimated all Santos’ activities, historic and future will directly disturb ~2,500ha or about 0.5% of the Pilliga’s total acreage.
Background

- Santos acquired ESG and its activities in November 2011.
- It soon became apparent that many of the former ESG sites, facilities and practices did not meet Santos’ standards.
- In December, 2011 issues with the Bibblewindi water treatment facility led Santos to shut the facility down and shut in the gas field.
- Santos undertook a series of high level investigations into ESG’s facilities to identify issues to be addressed.
- A Santos report completed in February 2012 outlined a number of issues and lead to a number of more detailed studies regarding ponds, dieback, land clearing, and the water treatment plant.
- As a result of these studies a number of clean up tasks were identified, rehabilitation plans were formulated, scoped and a works plan identified.
Carrying out thorough, successful rehabilitation of sites is a complex process particularly in an ecologically significant area like the Pilliga. It takes considerable time and has various stages:

- Detailed studies of the existing site and historical practices
- Development of a rehabilitation plan and analytical testing
- Regulatory review of the scope of work for each site
- Procurement of contractors
- Execution of work
- Analytical testing and validation of work conducted
- Close-out
While these more detailed remediation and rehabilitation plans were being developed and work programs finalised, improvements were made across all sites including:

- Improved signage identifying sites and contacts
- Fencing
- Repairs to access tracks
- General clean up of a number of sites
- Field soil plot trials began to assess the most effective means of remediating impacted soil across operational areas
Wilga Park Storage Yard

Before – 15 Jan 2012

After – 29 Oct 2012

- Rehabilitation activities were completed in February and March 2012.
Wilga Park Storage Yard

Before – 15 Feb 2012

After – 29 Oct 2012

- Rehabilitation activities included removal of residual equipment and drilling supplies.

- Previously stockpiled soil was sampled, classified, and removed in accordance with regulatory guidelines.
Narrabri Operations Centre


- Removal and safe disposal of excess chemical containers
- General clean up of area
Compliance Issues

- In addition to problems with the standards of facilities and maintenance of sites, regulatory compliance issues were discovered during Santos’ assessment and review process.

- The most significant concerned the sites near the Bibblewindi water treatment plant.

- In January 2012, Santos discovered an internal report stating that on 25 June 2011 approximately 10,000 litres of untreated saline water leaked from a pipe near the reverse osmosis plant at Bibblewindi.

- The leak had gone unreported and visibly impacted the nearby vegetation.

- Santos reported the incident to the regulator and began a full investigation.

- It was also discovered that over-clearing had occurred on some sites.
Bibblewindi Dieback

Before – 16 March 2012

After – 30 Oct 2012

- A remediation plan was developed, including soil treatment trials.
- Full rehabilitation scope compiled, sent for regulatory review.
- Tree felling and mulching began at the end of October 2012 to remove impacted vegetation.
- Additional work out for tender - anticipated start date end of November.
- Earthworks expected to be completed by February 2013.
Bibblewindi Water Treatment Plant

- Following Santos decision to shut down the plant in December and evidence of the spill in January, a review of the water treatment facility:
  - the reverse osmosis plant had a history of operational issues
  - the plant and ponds were not constructed to Santos standards and Santos has concerns with the integrity of the facilities

- It has been decided to construct a new central water treatment facility to manage all of the water from the proposed gas exploration development.

- An execution plan was prepared to properly shut down the Bibblewindi facility, and the removal of the plant began in October 2012.
Bibblewindi Water Treatment Plant

- Removal of the water treatment facility began in October 2012
- Expected date of completion is December 2013
Bibblewindi Ponds

- Three storage ponds are located at the Bibblewindi facility location.

- Substantial work has been carried out this year on the ponds:
  - Improvements to the condition of the pond banks
  - Stabilisation of the ponds
  - Integrity checks
  - Laboratory analysis of contents

- The decision to construct a new water storage facility means the ponds will eventually be removed and the site rehabilitated.

- Until then, to consolidate water in one location, water from around the fields is being centralised at the large Bibblewindi 3 pond.

- Water will remain in Bibblewindi 3 until the new facility completed.

- As a precautionary measure, additional monitoring devices are being installed and will remain in place until the stored water can be transferred to the new facility.
Excess Ponds

- There were a number of ponds throughout the permit area that were surplus to needs, some predating ESG.

- Following development of rehabilitation plans, regulatory approval, and procurement the execution phase is currently underway at Bohena 3 and 6, Bohena South and at Dewhurst.

- Execution includes:
  - Dewatering of the existing ponds and transporting of water to Bibblewindi 3.
  - Treatment of sediment in the pond and transporting it to the licensed Summerhill Landfill in Newcastle for proper disposal.
  - Removal of the pond liner and similar disposal in Newcastle.
  - Earthworks to till gypsum into the soil, return the area to its original contours and spread organic mulch to promote growth.
Bohena 3

Before – 26 April 2012

During – 29 October 2012

- Rehabilitation began at Bohena 3 in October 2012
- Expected date of completion 14 November 2012
Initial rehabilitation was conducted at Bohena 6 in March 2012

Follow up work is scheduled for December 2012
Bohena South

- Preliminary work commenced 5 November 2012
- Estimated to be completed by mid February 2013
Dewhurst

The Dewhurst ponds and tanks are located on private land and will be decommissioned and the site will be rehabilitated.

Currently being dewatered with rehabilitation activity to follow, scheduled for November 2012.

Duration of rehabilitation work is expected to be 6 weeks.

Before - 17 July 2012

During - 30 October 2012
Lease Site Rehabilitation

- Lease site rehabilitation includes:
  - Rehabilitation of previously over-cleared land
  - Rehabilitation of historical well pads and removal of sumps
  - Plugging and well abandonment
  - Monitoring of progress of sites which have undergone rehabilitation

- Also follow up review and monitoring of previously rehabilitated sites.

- Regrowth on some older Bohena sites has not progressed as expected, so follow up work is planned to add organic material to the soil.

- Anticipate completion of the Bohena sites in mid December 2012.
Over-Cleared Sites

- Review of identified over cleared sites was carried out in early 2012.
- Many over-cleared sites will be resolved as a result of other rehabilitation activities.
- Six sites were identified with total over-clearing of about 3 hectares.
- Procurement for rehabilitation of the 6 identified sites is now complete and work will be conducted in conjunction with other rehabilitation activities.
- Dewhurst 8, 10 and 11 will be conducted in conjunction with Dewhurst Pond and sump rehabilitation work. Work is estimated to commence early January 2013.
- Bibblewindi 10, 11 and 20 will be conducted in conjunction with Bibblewindi partial rehabilitation activities with estimated completion date in mid December 2012.
Historical Well Pads and Sumps

- Bibblewindi and Bohena well rehabilitation work has commenced.
- Sumps at Bibblewindi have been emptied and back-filled and general site rehabilitation is underway.
- Partial rehabilitation of Dewhurst sumps is to be completed in conjunction with Dewhurst Pond 8 rehabilitation.
- Work at these sites comprises a variety of activities including:
  - Plug and abandonment of existing wells
  - Safe removal of water from disused sumps
  - Remediation of the soil
  - Grading and restoration of surface contours
  - Rehabilitation process
Bohena 5

- Well head decommissioning was completed in August 2012
- Site rehabilitation scheduled for completion in December 2012
Rehabilitation activities began at Bibblewindi 13 on 8 October 2012
Work concluded on 8 November 2012
Bibblewindi 16

Rehabilitation began at Bibblewindi 16 on 8 October 2012

Work concluded on 8 November 2012
Rehabilitation began at Bibblewindi 17 on 13 October 2012

Work concluded 8 November 2012
Rehabilitation began at Bibblewindi 21H on 14 October 2012

Expected date of completion is mid November 2012
Future Plans - Water Treatment

- Santos is in the process of decommissioning existing water treatment facilities at Bibblewindi and is seeking to develop a sustainable treatment facility to support its exploration and appraisal activities.

- Acquired 250ha ‘Leewood’ property outside the Forest earlier this year.

- Santos believes this property is a suitable site for new treatment facilities.

- Property is located adjacent to the State Forest, 24 kilometres south west of Narrabri and close to existing and planned operations.

- Benefits:
  - facilitate the decommissioning and remediation of existing Bibblewindi water treatment facility
  - reduce vehicle movements in the Forest with the new site directly off the Newell Highway
  - allow scope to demonstrate beneficial reuse of water eg. irrigation
Leewood Development

- Proposed development at the Leewood site:
  - One 300ML produced water pond and one 300ML brine pond
  - Associated pipe work
  - One water bore
  - Additional facilities such as site office, storage, laydown and parking areas

- At Bibblewindi:
  - A 5ML produced water tank with associated pumping station and power supply adjacent the existing Bibblewindi 3 pond

- A produced water flow line and return flow line of approximately 16km
  - Flowlines will link Leewood ponds to the existing Bibblewindi 3 brine pond
  - Located within the previously cleared right of way for the gas flow line linking Wilga Park Power Station with the Bibblewindi Water Treatment Plant
Leewood Project will be split into two phases of work, storage and treatment.

The Review of Environmental Factors (REF) for Phase 1 has been prepared and will be lodged with the regulator for approval.

Phase 1 to be completed and operational by mid-2013 if approvals granted by early next year.

Phase 1 will enable brine to be transferred from the existing Bibblewindi 3 pond in the Pilliga to the new Leewood Ponds and the Bibblewindi ponds to be decommissioned and rehabilitated.

Approvals for Phase 2 will be lodged early in 2013, once the preliminary design is complete.
Future Plans – Rehabilitation of Wells

- In addition to the wells being currently worked on, a thorough review of wells in the Pilliga area was undertaken in 2012.

- A plug and abandon strategy and an execution plan prepared on the 45 existing wells.

- Fifteen wells are planned to be reconditioned for future use.

- The 30 other wells will be plugged, abandoned and the sites rehabilitated, as they are no longer required under Santos’ plans.

- With only about 50 new wells planned over Santos’ entire NSW acreage over the next three years, the rehabilitation of 30 existing wells will significantly streamline our operational footprint.
Well Abandonment Process

Bohena 5 – Sept - Oct 2012

Before

During

After
Summary

- Substantial progress has been made this year with the remediation of sites in and around the Pilliga.

- When work is completed:
  - eight surplus ponds will have been removed and the sites remediated
  - more than 20 lease sites will have been rehabilitated including the removal of many disused sumps
  - Bibblewindi dieback will have been rehabilitated
  - Over-clearing of six sites (approximately 3 hectares) rehabilitated
  - Supplementary rehabilitation carried out where rehabilitation has been slow, including soil treatment at the old Bohena sites
  - 15 wells upgraded, 30 plugged, abandoned and rehabilitated
  - Construction of purpose built high quality water storage and treatment facility to safely meet water processing demands for our exploration and appraisal program