

Narrabri Coal Seam Gas Utilisation Project (MP 07_0023)

Modification 3



1. Introduction

1.1. Background

The Narrabri Coal Seam Gas (CSG) Utilisation Project is located within Petroleum Assessment Lease (PAL) 2 and at the Wilga Park Power Station in the Narrabri region of NSW. Santos NSW (Eastern) Pty Ltd (Santos), the operating subsidiary of the former Eastern Star Gas Ltd (ESG) now owned by Santos Limited, is the operator of PAL 2 and adjoining tenements including Petroleum Exploration Licence (PEL) 238 and Petroleum Production Lease (PPL) 3. Santos NSW (Narrabri Power) Pty Ltd is the operator of Wilga Park Power Station.

Wilga Park Power Station was originally constructed and operated pursuant to a development consent granted by Narrabri Shire Council on 14 November 2002 and subsequent modifications. The consent and modifications allowed the power station to operate up to a capacity of 12 megawatts using gas extracted from the Coonarah Gas Field in PPL 3.

On 2 December 2008 the Minister for Planning approved the Narrabri CSG Utilisation Project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (MP 07_0023).

The approved project includes:

- construction and operation of gas gathering systems at the Bibblewindi and Bohena Coal Seam Gas Pilots
- construction and operation of gas compression facilities at the Bibblewindi and Bohena Coal Seam Gas Pilots
- construction of an approximately 32 kilometre buried gas flow line between the Bibblewindi and Bohena Pilot and the Wilga Park Power Station; and
- the staged expansion and operation of the Wilga Park (base load) gas-fired power station from a capacity of 12 megawatts to 40 megawatts, fuelled by coal seam gas extracted from the Bibblewindi and Bohena Coal Seam Gas Pilots.

Construction of works the subject of the approval commenced in 2009. Further works continued during 2010-2012. The works which have been undertaken under the approval to date include:

- construction of the gas gathering systems at the Bibblewindi and Bohena CSG Pilots
- construction of the gas compression facilities at the Bibblewindi and Bohena CSG Pilots
- construction of the 32 kilometre buried gas flow line between the Bibblewindi and Bohena pilots and the Wilga Park Power Station
- installation of 4 x 3MW gas generators at Wilga Park Power Station together with switch room, gas conditioning skid, auxiliary transformers, ventilation fans, substation upgrade and other related equipment.

The Minister for Planning approved a modification to the Narrabri CSG Utilisation Project on 11 February 2011 (MP 07_0023 MOD 1). The modification changed condition of approval (CoA) 2.34 relating to the submission date for the compensatory habitat package required.

The Planning Assessment Commission approved a further modification to the project on 14 March 2012 (MP 07_0023 MOD 2) allowing the temporary use of the gas flow line to transfer produced water. The approval for this modification allowed the transfer of water until 28 February 2013.

1.2. Proposed modification

Santos requests modifications to the project approval for the Narrabri CSG Utilisation Project under section 75W of the EP&A Act, on behalf of the titleholders of PAL 2, Santos NSW Pty Ltd and EnergyAustralia Narrabri Gas Pty Ltd, and the operator of Wilga Park Power Station, Santos NSW (Narrabri Power) Pty Ltd.

Santos is seeking approval for the following modifications:

1. Installation of a riser on the existing buried gas flow line which would allow materials (gas and liquids) to be diverted to the Leewood Produced Water Facility;
2. Use of the gas flow line to transfer liquids (including fresh water, produced water and brine) between the Tintsville ponds and the Bibblewindi Water Transfer facility and to the Leewood Produced Water Facility; and
3. Use of coal seam gas from existing or future wells within PAL 2 or PPL 3 at the Wilga Park Power Station.

2. Site and context

2.1. Project site

The project site, to which the major project approval (MP 07_0023) applies, is located within PEL 238 and PAL 2. PEL 238 encompasses a 7916 km² area overlying Narrabri and the Pilliga Forest to the south of Narrabri. PAL 2 is located in the centre of PEL 238 and covers a 267 km² area.

The original project site comprised the following areas:

- 86.6 hectares within the Bibblewindi State Forest, where the Bibblewindi CSG Pilot and gas gathering system are located.
- 14 hectares within the Pilliga East State Forest, where the Bohena CSG Pilot and gas gathering system are located.
- 20 metre wide gas easement for the 32 kilometre gas flow line located across 10 separate freehold land titles and crossing beneath road reserves of the Newell Highway and local roads.
- 1.59 hectares within the freehold title of Lot 1 DP 1064422, for the existing and extended Wilga Park Power Station.

The proposed riser would be located within the existing right of way for the gas flow line within a Santos owned property (Lot 1, DP 771141), known as Leewood, on which the Leewood Produced Water Facility is currently being constructed.

This modification application applies to the original project site as well as PAL 2 and PPL 3 as identified on Figure 2-1.

2.2. CSG infrastructure

Santos Limited acquired ESG in November 2011. At the time of acquisition, ESG's infrastructure included:

- Bohena CSG Pilot, associated gathering system and flow lines in PAL 2
- Bibblewindi CSG Pilot, associated gathering system and flow lines in PAL 2
- Bibblewindi Multi-Lateral Pilot, associated gathering system and flow lines within PAL 2
- Bibblewindi West Pilot, associated gathering system and flow lines within PAL 2
- Dewhurst 13-18H Pilot, associated gathering system and water storage areas in PEL 238
- Tintsville CSG Pilot, associated gathering system and water storage ponds (known as the Tintsville ponds) within PEL 238
- Wilga Park Power Station, gas compressor and flare at Bibblewindi and the 32 kilometre gas flow line between Bibblewindi and Wilga Park Power Station
- Bibblewindi Water Treatment Facility including a number of water/brine storage ponds and a reverse osmosis water treatment plant in PAL 2.

Following the acquisition, Santos carried out a full review of ESG's operations which identified a number of practices and infrastructure that did not meet Santos operational standards. Santos suspended operations and commenced a program of decommissioning and rehabilitation works. These works included plugging and abandoning wells no longer needed, decommissioning and rehabilitating water storage ponds, decommissioning the reverse osmosis plant at the Bibblewindi Water Treatment Facility (now known as the Bibblewindi Water Transfer Facility) and commencing rehabilitation of approximately 30 hectares of land.

Santos purchased the Leewood property outside of the Pilliga forest for the purpose of developing a new water management facility. The new facility will have state of the art technology, monitoring and environmental protection systems that meet Santos standards. The NSW Department of Trade and Investment Regional Infrastructure and Services (DTIRIS) approved the Leewood Produced Water Facility in March 2013 under Part 5 of the EP&A Act. The approval included construction of a water storage facility and associated infrastructure, transfer of produced water and brine stored at Bibblewindi to Leewood, and ongoing operation of the facility to store water from the pilot wells once returned to operation.

Santos plans to continue exploration, appraisal and evaluation of the CSG hydrocarbon potential in PEL 238 and PAL 2 and has developed the Energy NSW CSG Exploration and Appraisal Program (E&A Program). The E&A Program will assist in gaining further knowledge of coal fines, gas composition, flow rates and deliverability, well design, drilling and completion technologies. The E&A Program will be conducted over the next two to three years in stages and, subject to receiving necessary approvals, will include (refer to Figure 2-1):

- operation of the existing Bibblewindi Multi-Lateral Pilot (Bibblewindi 12, 13, 14, 15, 16, 17, 18H, 19H, 21H, 27, 28H and 29), the construction, drilling and operation of two additional pilot wells (Bibblewindi 31 and 32), and the operation of existing water flow lines from Bibblewindi Multi-Lateral Pilot to the Bibblewindi Water Transfer Facility
- operation of the existing Bibblewindi West Pilot (Bibblewindi 22, 23, 24, 25 and 26) and operation of existing water flow lines from the Bibblewindi West Pilot to the Bibblewindi Water Transfer Facility
- operation of the existing Dewhurst 13-18H Pilot (Dewhurst 13, 14, 15, 16H, 17H and 18H) and the construction, drilling and operation of additional lateral wells from well casing within Dewhurst 16H, 17H and 18H
- construction, drilling and operation of the Dewhurst 22-25 Pilot (Dewhurst 6, 22, 23, 24 and 25)
- construction, drilling and operation of the Dewhurst 26-31 Pilot (Dewhurst 26, 27, 28, 29, 30 and 31)
- operation of the existing Tintsfield CSG Pilot (Tintsfield 2, 3, 4, 5, 6 and 7), construction and operation of a flare to support the pilot and operation of the Tintsfield ponds to store water produced from the pilot before transfer of that water to Leewood
- construction of the Dewhurst Northern Water and Gas Flow Lines and operation of the Dewhurst Northern Water Flow Line
- construction of the Dewhurst Southern Water and Gas Flow Lines and operation of the Dewhurst Southern Water Flow Line
- construction and operation of a produced water tank at the Bibblewindi Water Transfer Facility to facilitate the transfer of produced water from the pilot wells to the Leewood Produced Water Facility
- construction and operation of the Leewood Water Pipeline to transfer water produced by the operation of the above pilot wells from the Bibblewindi Water Transfer Facility to the Leewood Produced Water Facility
- construction and operation of the Leewood Produced Water Facility to store water produced by the operation of the above pilot wells.

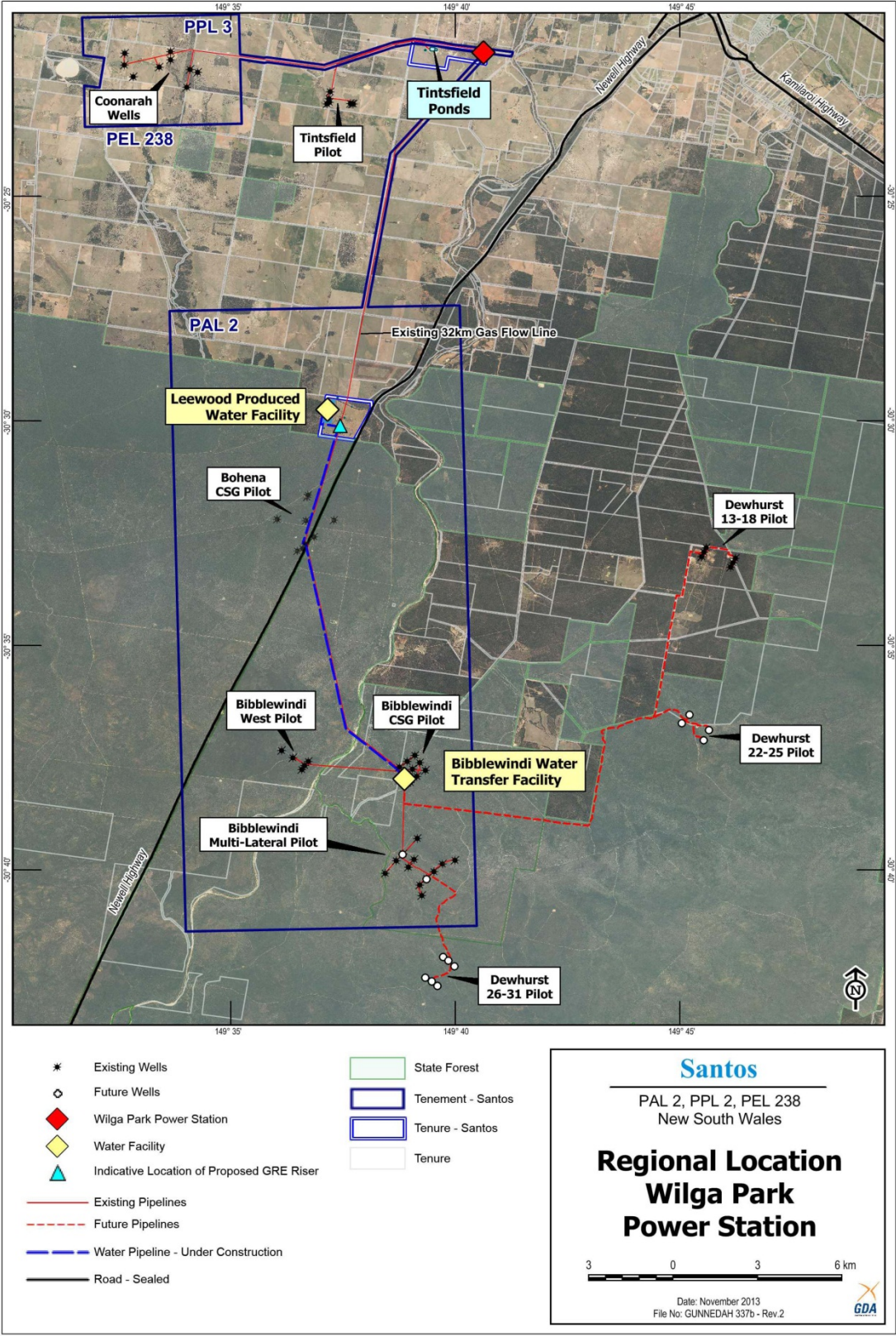


Figure 2-1 CSG infrastructure

These activities are either approved or are subject to separate environmental assessment and approval processes.

As exploration and appraisal continues within PEL 238 and PAL 2, additional wells will be developed. This modification application includes the use of gas from existing and future wells within PAL 2 and PPL 3 at Wilga Park Power Station.

3. Modification description

3.1. Proposed riser and use of gas flow line to transfer liquids

Santos proposes to install a riser with associated isolation valves and off-take points on the existing 32 kilometre buried gas flow line within the Leewood property (Lot 1, DP 771141). The riser would allow concurrent transfer of liquids, including fresh water, produced water and brine, between Tintsville ponds, the Bibblewindi Water Transfer Facility and Leewood. It would also allow the future diversion of gas from the flow line to the Leewood Produced Water Facility to power future plant and equipment should this be required.

Once the riser is installed, Santos proposes to use the existing flow line to transfer liquids, including fresh water, produced water and brine, between the Bibblewindi Water Transfer Facility, Tintsville ponds and the Leewood Produced Water Facility.

This modification application includes the construction of the riser and use of the gas flow line to transfer liquids, as detailed in the sections below.

3.1.1. Proposed riser

The proposed riser would be installed on an approximately 9.0 metre long section of the flow line, located within the Leewood property (refer to Figure 2-1). The riser would consist of glass reinforced epoxy (GRE) and carbon steel pipe, valves and fittings and would protrude approximately 1.2 metres above ground level. A schematic of the riser is shown in Figure 3-1.

Works to install the riser would be located entirely within the existing fenced right of way for the flow line. A trench, approximately 12 metres long, 5.0 metres wide and 2.0 metres deep would be excavated (mechanically and then by hand) to expose the section of flow line to be replaced by the riser. The section would then be removed and the riser installed.

Temporary above-ground pipes, pumps and fittings would be connected to the riser, as necessary, to transfer liquids from the riser to the required destination within Leewood.

Installation of the riser is proposed to commence in early 2014 and is expected to take approximately four weeks.

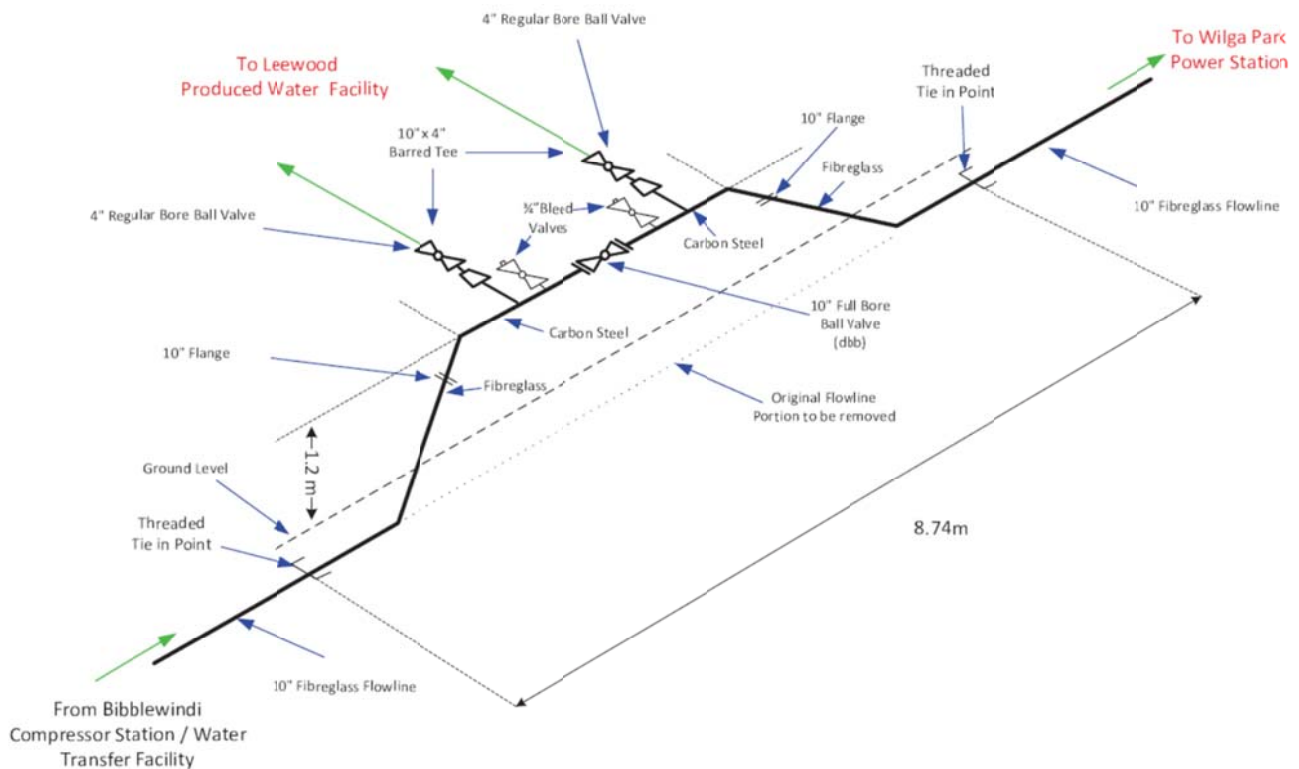


Figure 3-1 Proposed riser schematic

3.1.2. Transfer of liquids

Transfer of liquids along the flow line would commence once the proposed riser is installed. Fresh water from a licenced water bore at the Bibblewindi Water Transfer Facility would be transferred along the flow line to the Leewood Produced Water Facility during construction of the facility and associated rehabilitation activities. Fresh water may also be transferred along the flow line to the Tintfield area to support the future decommissioning and rehabilitation of the Tintfield ponds. Produced water and brine from the Bibblewindi Water Transfer Facility and the Tintfield ponds would be transferred along the flow line once the Leewood ponds are constructed and commissioned.

GRE piping is suitable for various uses including liquid transfer. Santos has transferred brine through this flow line during previous operations (in 2012).

The exact volume of liquids and timing of transfer would depend on operational requirements and would be determined by:

- construction water requirements
- fresh water requirements for rehabilitation
- production rates from licenced water bores
- timing of completion of the Leewood ponds
- timing of repairs or rehabilitation of ponds at the Bibblewindi Water Transfer Facility and Tintfield
- production rates from existing and proposed pilot wells within PAL 2 and PEL 238.

Precise discharge points within Leewood would depend on operational requirements and the liquid being transferred. Construction water would likely be delivered to a truck loading station approximately 100 metres

from the gas flow line. Produced water and brine would be discharged into the Leewood ponds once commissioned.

3.1.3. Future diversion of gas to Leewood

The future installation of permanent infrastructure to deliver gas from the riser to Leewood, and use of this gas to power plant and equipment at Leewood, would be subject to further assessment and approvals at a later stage. Approval for this permanent infrastructure and future use of gas is not sought as part of this modification application.

3.2. Use of gas from PAL 2 and PPL 3

The project approval relates to the use of gas at the Wilga Park Power Station sourced from the Bibblewindi and Bohena Coal Seam Gas Pilots. Santos is seeking modification of the project approval to enable the use of gas in the Wilga Park Power Station sourced from other wells within PAL 2 and PPL 3.

Other pilots existing within PAL 2 include the Bibblewindi Multi-Lateral Pilot and the Bibblewindi West Pilot. Santos has applied for development consent under Part 4 of the EP&A Act for an expansion of the Bibblewindi Multi-Lateral Pilot. Santos seeks approval to use gas from these pilot wells and other wells which may be constructed within PAL 2 and PPL 3 in the future. The construction of these future wells will be subject to separate assessment and approvals.

The use of gas from the other existing pilot wells within PAL 2 does not involve any physical works, as the gas gathering infrastructure for these pilots connected to infrastructure for the Bibblewindi CSG Pilot. The gas can therefore be sent through the existing flow line to Wilga Park Power Station which is the subject of the project approval.

It is requested that the words “the staged expansion and operation of the Wilga Park (base load) gas-fired power station from a capacity of 12 megawatts to 40 megawatts, fuelled by coal seam gas extracted from the Bibblewindi and Bohena Coal Seam Gas Pilots” be replaced with “the staged expansion and operation of the Wilga Park (base load) gas-fired power station from a capacity of 12 megawatts to 40 megawatts, fuelled by coal seam gas extracted from Petroleum Assessment Lease 2 and Petroleum Production Licence 3.”

Santos also requests that condition 1 of the project approval be amended to refer to this application.

4. Justification for modification

4.1. Proposed riser and use of gas flow line to transfer liquids

The proposed riser would have isolation valves and off-take points that would allow liquids to be transferred to the Leewood Produced Water Facility from Bibblewindi Water Transfer Facility and Tintsville ponds concurrently.

Water is required for dust suppression and other purposes during construction of the Leewood facility, and will be needed for rehabilitation of disturbed areas once the facility is operational. Water for construction purposes is currently being sourced from a licenced water bore on the Leewood property. However, the rate at which water can be extracted from this bore may not meet demand at all times during construction. Santos would like the flexibility to be able to transfer water from another licenced bore at Bibblewindi along the gas flow line during construction of Leewood.

Approval to utilise the existing gas flow line to transfer liquids will also allow the transfer of fresh water from the Bibblewindi licenced bore to the Tintsville area to support the future rehabilitation of the Tintsville ponds and associated dust suppression requirements.

Produced water and brine from previous CSG operations is currently being stored at the Bibblewindi Water Transfer Facility and the Tintsville ponds and is proposed to be transferred to the Leewood Produced Water Facility after it is commissioned.

Santos has approval to construct a produced water flow line and return flow line, within the existing gas flow line right of way, linking the proposed brine pond at Leewood to the Bibblewindi Water Transfer Facility. Using the existing gas flow line to transfer produced water/brine in addition to the new water flow lines (once constructed) would allow for increased capacity to transfer produced water and brine from Bibblewindi Water Transfer Facility to Leewood.

There is no water flow line between the Leewood facility and Tintsville ponds. Using the existing gas flow line to transfer water would avoid the need to construct additional infrastructure or truck water between the two sites.

The riser would also allow gas to be diverted to the Leewood facility in the future to operate plant and equipment. This would enable Leewood to be more self-sufficient and is a good use of any surplus gas not used in Wilga Park Power Station. Approval for this future use of gas is not part of this modification application and would be subject to further assessment and approvals at a later stage.

4.2. Use of gas from PAL 2 and PPL 3

The original development consent and major project approval only allow gas extracted from the Coonarah gas field and the Bibblewindi and Bohena CSG pilots to be consumed in Wilga Park Power Station. These wells are all currently suspended.

Since the major project approval was issued, the Bibblewindi West and Bibblewindi Multi-Lateral pilots have been developed within PAL 2. While these pilots are currently suspended, it is proposed to recommence their operation as part of the E&A Program. In addition, Santos has submitted an application to add two new wells to the Bibblewindi Multi-Lateral Pilot (Bibblewindi Gas Exploration Pilot Expansion project, SSD 13_5934).

The proposed modification would enable gas from all existing and any future CSG wells, once approved, within PPL 3 or PAL 2 to be used to fuel Wilga Park Power Station up to a capacity of 40 megawatts. This would increase the supply of gas to the power station so that it may operate up to its approved capacity. It would not increase the capacity of the power station beyond 40 megawatts and therefore would not result in additional noise or air emissions, or environmental impacts beyond those that were considered in the *Narrabri Coal Seam Gas Utilisation Project Environmental Assessment* (the original Environmental Assessment) and the associated assessment documents.

Beneficially using the gas from CSG pilots within PAL 2 and PPL 3 to fuel the Wilga Park Power Station would minimise flaring of gas and would help meet the demand for electricity in NSW. This would mean that less power has to be generated elsewhere to satisfy demand. As gas-fired power generation produces less greenhouse gases per unit of energy generated than coal-fired generation, there would be a net decrease in overall greenhouse gas emissions.

5. Planning and approvals

Part 3A of the EP&A Act was repealed on 1 October 2011 but continues to apply to projects approved under that Part. Under section 75W of the EP&A Act, a proponent may request the Minister to modify a project approval issued under Part 3A. This document supports a request for a modification of project approval MP 07_0023.

This modification application relates to a linear infrastructure project and is therefore exempt from the requirement to obtain landowners' consent due to clause 8F(1)(d) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). Under clause 8F(3) of the EP&A Regulation, there are advertising requirements for projects which are exempt from the need to obtain landowners' consent. The proposed modification will be advertised in a newspaper circulating in the Narrabri area prior to any public consultation period commencing.

Santos' Produced Water Management Plan for PEL 238, PAL 2 and PPL 3 was approved by DTIRIS and authorises the movement of produced water and brine from Bibblewindi Water Transfer Facility to Leewood

Produced Water Facility. Transfer of produced water/brine from Tintsville ponds to Leewood Produced Water Facility, and installation and operation of a temporary water line from the riser to Leewood ponds, would require an amendment to this plan.

The diversion of gas from the flow line to Leewood would require assessment and approval under Part 5 of the EP&A Act. Approval for this activity would be sought separately.

6. Consideration of potential impacts and mitigation

There would be minimal environmental impacts associated with the proposed modification.

The existing gas flow line right of way, where the riser is to be installed, is a previously disturbed area. The right of way was surveyed for ecological constraints as part of the original Environmental Assessment and again as part of the *Leewood – Produced Water & Brine management Ponds Review of Environmental Factors* (RPS December 2012).

The vegetation across the majority of the Leewood property, including the right of way, consists of derived grasslands of the Pilliga Box-White Cypress Pine Grassy open woodland on alluvial loams, Darling Riverine Plains and Brigalow Belt South. This community is highly modified from the removal of canopy vegetation and past grazing. Installation of the riser would require removal of non-significant groundcover vegetation only.

The right of way was also surveyed for potential cultural heritage sites as part of the original Environmental Assessment. No sites or objects were detected during the survey or the subsequent construction works to install the gas flow line.

Removal of groundcover and excavation works would increase the erosion potential of the site. Potential impacts would be managed through use of erosion and sedimentation controls and the minimal construction timeframe (around four weeks).

There is a risk of fauna becoming trapped in the open trench. The trench would have steps which would assist any trapped fauna to escape. The open trench would be inspected for trapped fauna each day before construction commences and at the completion of construction for that day.

Noise and air quality impacts associated with installation of the riser would be negligible particularly considering the activities going on at Leewood as part of the produced water facility construction. Where necessary, exposed soil would be dampened down to reduce dust emissions.

There is minimal risk of the gas flow line or temporary infrastructure leaking or rupturing during transfer of liquids. No integrity issues were identified during recent low pressure testing of the flow line. Non-drip fittings would be installed on temporary pipes and pumps within the Leewood property. Use of temporary infrastructure would be closely monitored by construction personnel and any issues promptly rectified.

There would be significant environmental benefits from the proposed modification. The riser would allow the quicker emptying of ponds at Bibblewindi Water Transfer Facility and Tintsville into the Leewood ponds which will have superior leak detection and environmental protection systems.

If approved at a later date, the future diversion of gas from the flow line to the Leewood Produced Water Facility would allow this facility to become more self-sufficient and reduce its reliance on imported fuels. Using gas to power plant and equipment at the facility would reduce greenhouse gas emissions compared to using diesel fuel.

The ability to use gas from additional pilots within PAL 2 and PPL 3, in Wilga Park Power Station, would help meet the demand for electricity in NSW, reducing reliance on less efficient energy sources such as traditional coal-fired power stations.

7. Conclusion

The proposed modifications are minor in nature and unlikely to significantly increase the environmental impacts of the previously approved project.

The proposed riser and use of the flow line to transfer liquids would help to provide a more reliable source of water during construction and rehabilitation of Leewood and the Tintfield ponds. It would also enable produced water and brine to be more efficiently transferred to the Leewood Produced Water Facility once operational.

In addition, the proposed riser would enable gas to be used as a fuel source to power equipment at the Leewood facility in the future.

Use of CSG from all existing and future CSG wells PAL 2 and PPL 3 would increase opportunities to utilise gas generated by appraisal activities which would otherwise be vented or flared.

The proposed modifications would also allow the benefits of the project to be more fully realised, including:

- increased reliability of electricity supply to power networks during peak demand periods
- the provision of additional social and economic benefits to the Narrabri local government area
- the resumption of operation of the Wilga Park Power Station
- improved environmental outcomes from lower greenhouse gas emissions per unit of energy output when compared to conventional coal-fired power generation.