



Review of Environmental Factors

Temporary Lifted Water Management - Bibblewindi Pond 3

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Approval for Issue

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Titleholder Declaration (Joint Titleholder)	<p>As joint titleholder I declare that the information contained in this Review of Environmental Factors is neither false nor misleading.</p> <p>Name: Eastern Star Gas Limited (a Santos Limited company) (as joint title holder declaration)</p> <p>Signature:</p> <p>Date:</p>

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Executive Summary

Overview

RPS has prepared this Review of Environmental Factors (REF) on behalf of Santos to assess the environmental impact of the proposed temporary installation of DN315 and DN200 high-density polyethylene (HDPE) piping and pumps to enable up to 60 ML of lifted water to be transferred from the existing Bibblewindi Pond 3 located at the Bibblewindi lifted water management plant in PAL 2, through an existing gas and/or water pipeline, to the existing Tintsville Pond 2 located near the Wilga Park power station in PEL 238.

Subsequently Santos proposes to reconfigure the HDPE piping and pumps to enable the lifted water to be transferred back from Tintsville Pond 2, via the gas and/or water pipeline, to Bibblewindi Pond 3 once capacity has been restored and lifted water management resolved.

The establishment of these temporary facilities is an emergency, short term solution. A long term strategy to manage lifted water produced as part of coal seam gas appraisal operations is currently underway, and will be subject to separate environmental assessment and approvals.

Bibblewindi Pond 3 is within 40cm of the overflow pipe and a significant rain event could cause the pond to overflow. Tintsville Pond 2 is able to take up to 80ML of lifted water as it is currently under filled.

An assessment of the subject site has been undertaken by an RPS ecologist to assist in the preparation of this REF.

Consideration has also been given to a broader range of environmental impacts, including heritage, air, surface water, soils, chemical and hazardous substances management, contaminated land, waste minimisation and management, natural resources, local community and neighbouring properties, visual impacts, land use and cumulative environmental effects.

Environmental Impacts

Ecology

No Endangered Ecological Communities (EECs) nor threatened fauna or flora species listed under the *Threatened Species Conservation Act 1997* (TSC Act) and/or *Environment Protection Biodiversity Conservation Act* (EPBC Act) were recorded within the study area. Additionally, the likelihood of threatened flora and fauna species occurring in the study area is considered to be low.

While the proposed pipes are located adjacent to areas that provide habitat for a range of common generalist species, the impacts to these habitats associated with the proposed activity are expected to be negligible. The installation of the pipes has the potential to temporarily impact upon resident fauna population due to noise and vibrations.

Matters of National Significance

The proposed activities will not have, nor are likely to have a significant impact on matters of national environmental significance (MNES), as defined by the EPBC Act.

Heritage

A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 13 January 2012. No items of cultural heritage were located in the vicinity of either the Bibblewindi or Wilga Park portions of the project area. A site inspection was conducted on Wednesday, 25 January 2012 by Deborah Farina, archaeologist (RPS) along the route of the pipeline. The route measures approximately three km in total, with one km of the pipeline located at Bibblewindi and two km at Wilga Park. Both portions of the pipeline route are in disturbed landscapes through previous construction, road grading and land clearance (Bibblewindi) and agricultural endeavours (Wilga Park). No Aboriginal cultural heritage sites were identified as part of the site inspection.

There are no Commonwealth heritage items listed for Bibblewindi or Wilga Park. A search of the Australian Heritage Places Inventory (AHPI) showed nine items listed for the Narrabri LGA, however none of these items are located within the vicinity of the project area.

Searches of the State Heritage Inventory, Schedule 2 of the *Narrabri Local Environment Plan 1992* and Schedule 1 of the *Narrabri Local Environment Plan No. 2* show that there are no heritage items within the vicinity of either the Bibblewindi or Wilga Park portions of the project area. Accordingly, there are no constraints to the project in respect of European heritage.

Surface and Groundwater

The proposal does not involve any drilling.

There are no earthworks or drilling associated with the proposed operations and therefore there is unlikely to be impacts in terms of erosion and sedimentation.

There is potential for lifted water and fuels to come into contact with watercourses and therefore mitigation measures have been identified to minimise this risk.

No impact on surface water or groundwater would be expected from this activity.

Air

The air emissions associated with the proposal will be dust and greenhouse gases.

There is potential for small amounts of dust to be generated through the movement of machinery during the construction of the HDPE pipeline and pumps. There will be no clearing of access tracks required. There will be minimal vehicle movements to and from site during operation resulting in the generation of minimal dust.

Greenhouse gases will be generated as a result of the operation of construction machinery and from pumps and compressors. Greenhouse gases will also be generated during commissioning when the existing pipeline is vented. The emission of greenhouse gases will be short-term and temporary and is considered insignificant.

Noise

Noise will be generated by the movement of construction and operational vehicles, and by the pumps and compressors.

The nearest residence is approximately 900m South East from the Wilga Park/ Tintfield site. Residences are approximately 5km north and northeast of the Bibblewindi site. The installation and operational noise of the temporary facility will not result in significant noise impacts.

Soils

No new tracks will need to be constructed as part of the proposed operations. There will be no earthworks or drilling associated with the proposal. There will therefore be no stripping of topsoil and no soil is proposed to be removed from site.

There is a very small potential risk of soil erosion resulting in sediment transport to local waterways. However this is considered unlikely on the basis that there will be no additional ground disturbance as a result of the proposal. There is also a small potential risk of soil contamination occurring from the proposed activities. Mitigation measures, including appropriate erosion and sediment control and waste storage and handling, have been proposed to mitigate against this risk.

Chemical and Hazardous Substance Management

The activities will only use chemicals such as biocide, fuels and oils, with some potential risk of fire and pollution to land, water and air if an accidental spillage was to occur.

Any spills during activities will be managed by applying best practice principles, will be in accordance with all legislation and standards for the safe handling and storage of hazardous substances and dangerous goods and comply with all occupational health and safety requirements. Any contaminated soil will be removed from the site.

Contaminated Land

Proposed operations have the potential to result in some contamination due to chemical or fuel spills, however these are considered highly unlikely.

It is considered that the potential impacts associated with contamination can be appropriately managed if the mitigation measures set out for surface water, soils and chemical and hazardous substances management are implemented.

Waste Minimisation and Management

General construction and site operations waste will be produced as part of the proposed activities. This will be managed in an appropriate manner to avoid health risks and contamination of land and waterways.

Natural Resource Use

The key natural resources that would be affected by the proposed activities are agricultural land resources and fuels. There would be no impact on forestry resources.

The restriction of use of agricultural land resources or overuse of natural resources as a result of the activity are not considered to be likely.

Land Use

The Tintsville site is part of an agricultural property and the Bibblewindi site is within already disturbed land within Bibblewindi State Forest. The locations of the pumps, compressors and pipes are temporary and have been selected to minimise direct impacts on land use.

Local Community and Neighbouring Properties

The proposed activities that are the subject of this REF are temporary and there are no residences within 900m of the site. The movement of traffic during installation and operation of the temporary facility are not considered to contribute to significant impacts on the local community.

Appropriate consultation with the local community will be undertaken to ensure community members are kept informed of proposed operations.

Visual Assessment

No significant impacts on the visual amenity of the area are expected from the proposal.

Cumulative Environmental Impacts

There are not expected to be any cumulative impacts associated with the proposal.

Conclusion

This REF has been prepared in accordance with Clause 228 of the *Environmental Planning and Assessment Regulation 2000* and provides consideration of the environmental impact of the proposed works as required by Section 111 of the *Environmental Planning and Assessment Act 1979*. The proposal comprises temporary works. The REF has identified that the proposed temporary installation of HDPE piping and pumps and associated activities is not likely to significantly affect the environment or threatened species, populations or ecological communities or their habitats.

1.0 Introduction

1.1 Background

RPS has prepared this Review of Environmental Factors (REF) on behalf of Santos to assess the environmental impact of the proposed temporary installation of DN315 and DN200 high-density polyethylene (HDPE) piping and pumps to enable up to 60 ML of lifted water to be transferred from the existing Bibblewindi Pond 3 located at the Bibblewindi lifted water management plant in PAL 2, through an existing gas and/or water pipeline, to the existing Tintsville Pond 2 located near the Wilga Park power station in PEL 238. The locations of the sites are shown in Figure 1-1.

Subsequently Santos proposes to reconfigure the HDPE piping and pumps to enable the lifted water to be transferred back from Tintsville Pond 2, via the gas and/or water pipeline, to Bibblewindi Pond 3 once capacity has been restored and lifted water management has been resolved.

The establishment of these temporary facilities and transfer of lifted water is a temporary, emergency solution. Bibblewindi Pond 3 is within 40cm of the overflow pipe and a significant rain event could cause the pond to overflow. Tintsville Pond 2 is able to take up to 80ML lifted water as it is currently under filled

A medium and long term strategy to manage lifted water produced as part of coal seam gas appraisal operations is currently underway.

Medium term – 12 months

Bibblewindi fixed plant one and two will be upgraded to high pressure, high TDS capable lifted water management plants. This will allow a greater range of water quality to be processed from both Bibblewindi Pond 3 and pilot well lifted water. Whilst fixed plant one and two are being upgraded a temporary high TDS capable rental plant will be installed and commissioned to draw down and process additional Pond 3 water. The permeate from all plants will be sent to an additional polishing water management plant to ensure the permeate meets all required water quality targets.

These actions will result in a fully flexible water management facility capable of processing lifted water to maintain the site water balance and pond levels at safe storage levels.

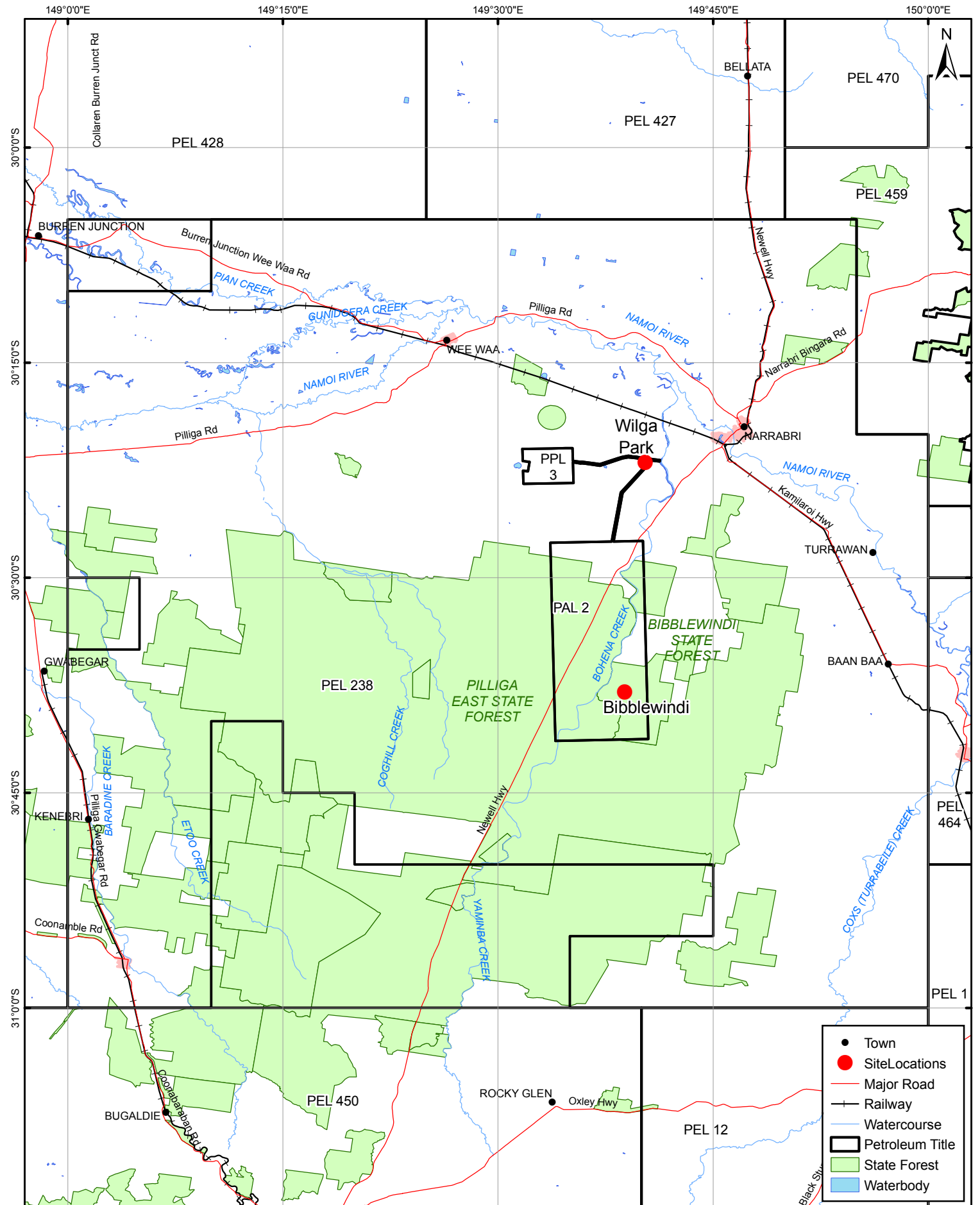
Long term – 12 months to 2 years

Three long term lifted water solutions are currently planned and budgeted to be fully investigated and trialled over the 2012 calendar year. These include:

1. Lifted water/ brine injection;
2. Thermal brine concentrator technology; and,
3. Selective salt production.

The results of these trials will provide detailed information to make a final decision of the preferred long term lifted water management options.

Santos propose to modify the Part 3A Project Approval for the existing gas pipeline (which is a 32km buried gas pipeline from the Bibblewindi compressor station to the Wilga Park Power station) to carry water.



Client: **Santos**

Compiled by: TW	Date: 01/2012
Approved by: JAK	Date: 01/2012

0 5 10 20 30 km
Datum: GDA94

Location Map

Figure 1-1 Project: **Temporary Brine Management REF**

Source: Base topographic data © Commonwealth of Australia (Geoscience Australia) 2006.
Petroleum Title Applications © DPI 2011.



It has been agreed between the Regulators and Santos that the process for approval will be as follows:

- Amendment to the Part 3A Project Approval to change the description of the pipeline as transporting gas and/or water+
- Submission of a Review of Environmental Factors (REF) for approval to implement the aboveground HDPE pipe which will join the Bibblewindi Pond 3 to the gas and/or water pipeline and the aboveground HDPE pipe to join the gas and/or water pipeline to the Tintfield Pond 2 (this REF).

This REF has been prepared in accordance with Clause 228 of the Environmental Planning and Assessment *Regulation 2000* and provides consideration of the environmental impact of the proposed works as required by Section 111 of the *Environmental Planning and Assessment Act 1979*.

1.2 Technical Investigation

A specialist Ecological Assessment has been prepared by RPS to assist in the preparation of this REF. Desktop searches and assessments have been conducted for other issues and risks.

1.3 Structure of REF

This REF comprises the following:

- Section 1 introduces the proposal and provides an overview of the REF.
- Section 2 provides an overview of the site, locality and key site features.
- Section 3 provides a detailed description of the activities to be undertaken as part of the proposal.
- Section 4 discusses the relevant planning legislation associated with the proposal.
- Section 5 considers the likely environmental impacts of the proposal and recommends mitigation measures to ensure these impacts are appropriately managed.
- Section 6 concludes the REF.

2.0 Site Description and Context

There are two sites identified where temporary facilities will be located; Bibblewindi and Wilga Park/ Tintfield.

2.1 Location & description

The activities proposed within the Bibblewindi site are contained within cleared areas associated with Santosq existing operations. The site is located within the Bibblewindi State Forest, east of Bohena Creek. Bibblewindi State Forest is bordered by Pilliga State Forest to the east, west and south. The Bibblewindi Pond 3 is located at the Bibblewindi lifted water management plant in PAL 2.

The Wilga Park/ Tintfield site is located within private freehold land to the southwest of Narrabri. The existing Tintfield Pond 2 is located near the Wilga Park power station in PEL 238.

2.2 Topography

The Bibblewindi site is flat to undulating. Indicative elevations for the Bibblewindi site are approximately 280m Australian Height Datum (AHD) and generally fall to the west and northwest.

The Wilga Park/ Tintfield area is flat to very flat. It has indicative elevations of approximately 220m AHD and fall gently away to the north and northwest towards the Namoi River.

2.3 Flora and Fauna

An assessment was undertaken over the Wilga Park and Bibblewindi sites by an RPS ecologist on 11th January 2012. Surveys included ground-truthing of the vegetation communities and assessment of habitats, including assessment of the site to provide suitable habitats for threatened flora or fauna. In addition, all trees within the expected development footprint were recorded using a differential GPS with sub-metre accuracy.

The proposed footprint for the aboveground HDPE piping at Wilga Park occurs along an existing cleared fence line and track. The cleared land occurs adjacent to an area of woodland, dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Allocasuarina luehmannii* (Bulloak), with *E. pilligaensis* (Pilliga Box) and *E. blakelyi* (Blakely's Red Gum) recorded less frequently. This community is not commensurate with any ecological community listed under either the TSC Act and/or EPBC Act.

The proposed footprint for the aboveground HDPE piping at Bibblewindi occurs within cleared areas associated with existing activities. No areas of vegetation would therefore be required to be removed for the installation of the piping.

During physical surveys, no threatened fauna or flora species listed under the TSC Act and/or EPBC Act were recorded on either site.

2.4 Drainage

The Bibblewindi site lies within the Namoi River Basin catchment, one of the main tributaries of the Barwon Darling River System. The Namoi River Basin covers an area of 43,000 square kilometres.

Bohena Creek is the major drainage feature in the area, with a sub-catchment area of 1500 square kilometres. It is ephemeral in nature, flowing after significant rainfall in the catchment further south towards the north western margins on the Warrumbungle Ranges.

The Wilga Park/ Tintfield site lies within the vicinity of Mollee Creek, a moderately well defined ephemeral creek with some semi-permanent water holes. There are no permanent flows within or adjacent to the site with surface run off from the localised drainage features generally being poorly defined sheet flow towards this and other drainage features. As a consequence of the very low slope angles, surface run off tends to pond after heavy rain with some areas becoming swampy or temporarily inundated.

2.5 Heritage

2.5.1 Aboriginal heritage

It is proposed that the HDPE pipeline for the Bibblewindi portion of the project will be located entirely inside the existing Bibblewindi lifted water management area. The route of the HDPE pipeline comprises highly disturbed land attributable to the construction of the lifted water management facility.

In respect to the Wilga Park portion of the project area, it is proposed that the HDPE pipeline will run along an existing fence line from the Wilga Park power station to Tintfield Pond 2. The route of this portion of the pipeline is disturbed.

Aboriginal heritage (places, sites and objects) within NSW are protected by the *National Parks and Wildlife Act 1974* (NPW Act). Although there are other Acts protecting and managing cultural heritage in New South Wales, the due diligence procedure is only available to projects applicable under this Act.

The NSW Government is working towards stand alone legislation to protect Aboriginal cultural heritage which will be a significant reform for NSW. The first stage of this work has been completed and includes significant changes to the NPW Act. Administration of that legislation is now overseen by the Office of Environment and Heritage (OEH) (formerly DECCW) as part of the NSW Department of Premier and Cabinet.

Changes to the NPW Act were made effective on 1 October 2010 and include:

- increased penalties for Aboriginal heritage offences, in some cases from \$22,000 up to \$1.1 million in the case of companies who do not comply with the legislation;
- ensuring companies or individuals cannot claim no knowledge in cases of serious harm to Aboriginal heritage places and objects by creating new strict liability offences under the Act;
- introducing remediation provisions to ensure people who illegally harm significant Aboriginal sites are forced to repair the damage, without need for a court order;
- unification of Aboriginal heritage permits into a single, more flexible permit; and
- strengthened offences around breaches of Aboriginal heritage permit conditions.

Along with new offences summarised above, there are new defences that have been introduced which will apply where a person harms an Aboriginal object without knowing what it was and without a permit from OEH. One of these defences is the due diligence defence (s87(2)), which states that if a person or company has exercised due diligence to ascertain that no Aboriginal object was likely to be harmed as a result of the activities proposed for the site, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it transpires that an object was harmed. As a consequence of this provision, OEH released a publication entitled *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. This publication sets out a minimum benchmark for acceptable due diligence investigations to be followed. These investigations include:

- the carrying out of a search of the Aboriginal Heritage Information Management System (AHIMS) database to ensure there are no registered sites within the Project Area;
- a review of previous archaeological investigations in the Project Area; and
- an assessment of the relevant landscape features and visual inspection to determine whether there are Aboriginal objects present within the Project Area or that they are likely.

Aboriginal consultation is not required for an investigation under due diligence. However, if the due diligence investigation shows that the activities proposed for the area are likely to harm objects or likely objects within the landscape, then an AHIP will be required with full consultation.

A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 13 January 2012. The radius of the Bibblewindi search was 1.5 km from a central point along the HDPE pipeline route and the radius of the Wilga Park search was 1.5 km from a central point along the HDPE pipeline route. The searches both adequately covered the immediate pipeline routes and adjacent areas. No items of cultural heritage were located in the vicinity of either the Bibblewindi or Wilga Park portions of the project area. No previous archaeological investigations were identified within the vicinity of the project area.

A site inspection was conducted on Wednesday, 25 January 2012 by Deborah Farina, archaeologist (RPS) along the route of the pipeline. The route measures approximately three km in total, with one km of the pipeline located at Bibblewindi and two km at Wilga Park. Both portions of the pipeline route are in disturbed landscapes through previous construction, road grading and land clearance (Bibblewindi) and agricultural endeavours (Wilga Park). No Aboriginal cultural heritage sites were identified as part of the site inspection.

2.5.2 Other heritage

There are no Commonwealth heritage items listed for Bibblewindi or Wilga Park. A search of the Australian Heritage Places Inventory (AHPI) showed nine items listed for the Narrabri LGA, however none of these items are located within the vicinity of the project area.

Searches of the State Heritage Inventory, Schedule 2 of the *Narrabri Local Environment Plan 1992* and Schedule 1 of the *Narrabri Local Environment Plan No. 2* show that there are no heritage items within the vicinity of either the Bibblewindi or Wilga Park portions of the project area.

2.6 Land Use

The Bibblewindi site is surrounded by native woodland vegetation within the Bibblewindi State Forest. The area is made up of forest types 190 (White Cypress Pine-Brown Bloodwood) and type 189 (White Cypress Pine-Narrow leaved Ironbark). Commercially, the forest in this area is considered of low quality and low productive capacity. The occupation of State Forestsland for the purposes of petroleum exploration and production is subject to an occupation permit under the *Forestry Act 1916*.

The Wilga Park/ Tintfield site is located within private freehold land to the southwest of Narrabri and has previously been cultivated for both cropping and grazing activities. Santosqexisting activities are conducted while maintaining present land uses.

2.7 Air Quality and Greenhouse Gases

The existing air quality of the locality is typical of a rural area with the majority of air emissions and pollutants arising from existing agricultural activities such as stock grazing, land clearing and soil preparation, sowing and harvesting of crops, vehicle and heavy machinery movements, bushfires and burn-offs.

The current approved coal seam gas activities and the gas fired power station at Wilga Park also contribute to local air emissions and pollutants. These contributions are subject to existing approvals and control measures.

3.0 Project Description

3.1 Introduction

Santos proposes to install temporary HDPE piping and pumps to enable up to 60ML of lifted water to be transferred from the existing Bibblewindi Pond 3 located at the Bibblewindi lifted water management plant in PAL 2, through an existing gas and/or water pipeline, to the existing Tintsville Pond 2 located near the Wilga Park power station in PEL 238. Both the Bibblewindi Pond 3 and the Tintsville Pond 2 were designed and constructed to the same standards and both ponds contain a 2mm thick HDPE liner so there is no change in the risk associated with storing this lifted water.

Subsequently Santos proposes to reconfigure the HDPE piping and pumps to enable the lifted water to be transferred back from Tintsville Pond 2, via the existing gas and/or water pipeline, to Bibblewindi Pond 3.

In summary, the work involves:

- Installation of temporary aboveground HDPE piping from Bibblewindi Pond 3 to the Bibblewindi compressor station compound.
- Installation of a temporary pump and an air compressor within the Bibblewindi compressor station compound and a priming pump at Bibblewindi Pond 3.
- Installation of temporary aboveground HDPE piping from the Wilga Park power station to Tintsville Pond 2.
- Operation of the existing gas and/or water pipeline in lifted water service for up to 4 weeks to transfer up to 60ML of lifted water from Bibblewindi Pond 3 to Tintsville Pond 2.
- Removal of the pumps from the Bibblewindi area and installation of one or two similar pumps at Tintsville Pond 2 and/or near the Wilga Park power station.
- Modification of the HDPE piping to enable the flow to be reversed.
- Operation of the existing gas and/or water pipeline in lifted water service for up to 4 weeks to transfer up to 60ML of lifted water from Tintsville Pond 2 to Bibblewindi Pond 3.
- Removal of the aboveground HDPE piping, pumps and air compressor.
- Rehabilitation as required.

A scouting survey has been undertaken to locate the HDPE piping to minimise impacts on the environment.

3.2 Water Quality

Water samples from the Bibblewindi Pond 3 were collected on 19 December 2011 and tested by Symbio Alliance on 21 December 2011 for key physical and chemical parameters, as outlined in Table 3-1. The following results characterise the quality of water which will be travelling through the pipeline between Bibblewindi Pond 3 and Tintsville Pond 2.

Table 3-1 Water Quality of Bibblewindi Pond 3 (21 December 2011)

Sample Description	Bibblewindi Pond 3
pH	9.07 @ 21 degrees celsius
Electrical Conductivity	42.28
Soilds (Suspended)	20
Soilds (Dissolved)	36,200
Ortho-phosphorus	3.2

Sample Description	Bibblewindi Pond 3
Iron (filtered)	5.01
Iron (Filtered)	0.70
Aluminium (Filtered)	0.24
Calcium (Filtered)	13.5
Potassium (Filtered)	288
Magnesium (Filtered)	12.9
Sodium (Filtered)	13,900
Ammonia-Nitrogen	4.3
Alkalinity (Total)	24,100
Alkalinity (HCO ₃)	13,100
Alkalinity (CO ₃)	10,900
Alkalinity (OH)	<1
Sulphur (Total)	0.4
Sulphur (as SO ₄)#	1.1
Chloride	8,221
Sum of Anions	713
Sum of Cations	615
Ion Balance	-7.39
Copper (Filtered)	0.0124
Zinc (Filtered)	0.0037
Arsenic (Filtered)	0.0410
Manganese (Filtered)	0.0284
Chromium (Filtered)	0.312
Chromium (Total)	0.449
Hexavalent Chromium	<0.05
Cadmium (Filtered)	0.0148
Mercury (Filtered)	0.0002
Lead (Filtered)	0.0009
Nitrate-Nitrogen	0.008
Nitrite-Nitrogen	<0.01
Nitrogen (TKN)	12.2
Nitrogen (Total)	12.2
Total Organic Carbon	19
Benzene	<1
Ethylbenzene	<1
Toluene	<1
Xylenes	<2
Surrogate 1,2-dichlorobenzene-d	86.0
Surrogate Chlorobenzene-d5	99.0
Surrogate Fluorobenzene	84.0
<i># result derived from calculation</i>	

3.3 Site preparation

No earthworks will be required because all piping will be installed aboveground in areas that have been previously disturbed for installation of existing Santos facilities and a Telstra line.

3.4 Installation of HDPE piping

Approximately 350m of temporary DN315 HDPE piping will be installed aboveground from the northwest corner of Bibblewindi Pond 3, along the fence line of the existing flare compound, to the Bibblewindi compressor station compound (refer Figure 3-1). Aboveground piping is proposed because it is temporary and to avoid the environmental impact of burying the piping. The piping will be suitably anchored to mitigate the risks associated with pipe movement.



Figure 3-1 Proposed Facilities at Bibblewindi

Approximately 2.1km of temporary DN200 HDPE piping will be installed aboveground from the Wilga Park power station, along the fence line of the Wilga Park property, to Tintsville Pond 2 (refer Figure 3-2). Aboveground piping is proposed because it is temporary and to avoid the environmental impact of burying the piping. The piping will be suitably anchored to mitigate the risks associated with pipe movement.

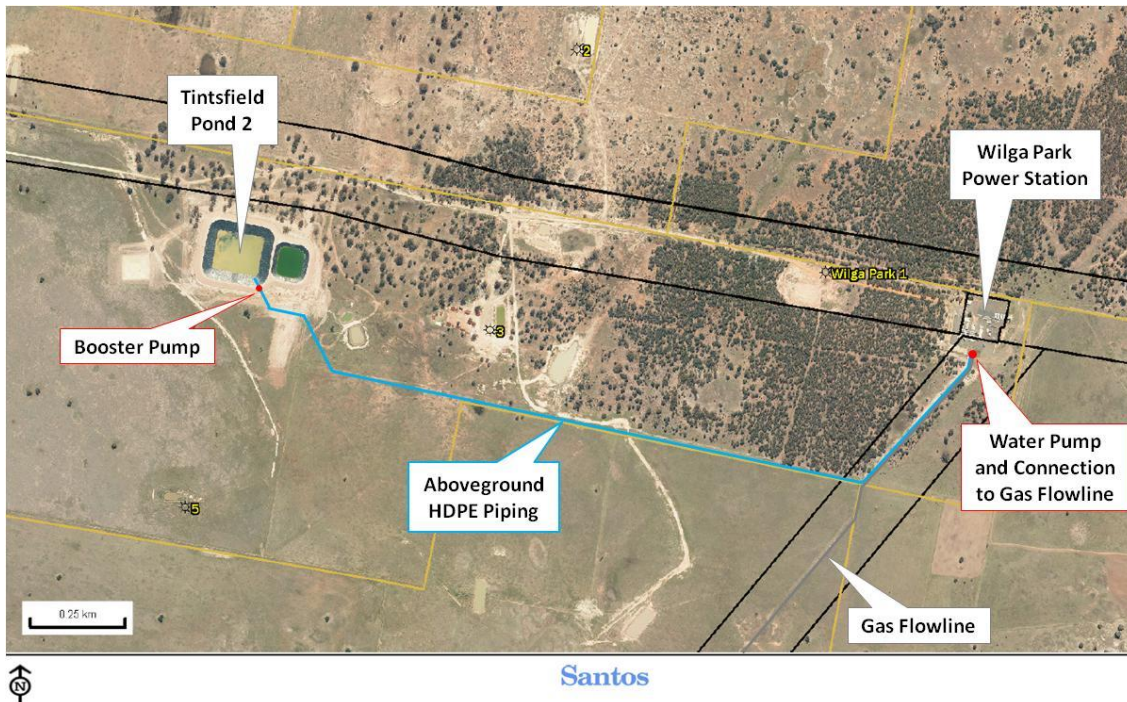


Figure 3-2 Proposed Facilities at Wilga Park and Tintsville Pond 2

3.5 Installation of Equipment – Bibblewindi to Tintsville Transfer

A main transfer pump will be installed within the existing Bibblewindi compressor station compound. The pump suction will be connected to the new DN315 HDPE piping and the pump discharge will be connected to the existing gas and/or water pipeline, which will be positively isolated from the gas facilities. The transfer pump is a diesel driven pump. The diesel storage tank is a double wall (self contained) steel tank with a vent and conforms to the requirements of AS 1940 and AS 1692.

A small priming pump will be installed at Bibblewindi Pond 3. The priming pump suction will be connected to a hose placed into the pond and the discharge will be connected to the new DN315 HDPE piping. The priming pump is a petrol driven pump. The priming pump and main transfer pump will be installed on spill containment units with sufficient capacity to contain all fluids to prevent ground contamination from any leaks.

An air compressor will be installed within the existing Bibblewindi compressor station compound and connected to the existing gas and/or water pipeline. The air compressor will be used to pig the existing gas and/or water pipeline line before and after the lifted water transfer. The air compressor is diesel driven and will also be installed on a spill containment unit with sufficient capacity to contain all fluids to prevent ground contamination from any leaks.

An infra-red surveillance camera will be installed at the Tintsville Pond 2 to enable Operations personnel to monitor the flow into the pond on a 24 hour basis.

3.6 Operation of the existing gas and/or water pipeline in lifted water service – Bibblewindi to Tintsville Transfer

Commissioning will include drawing as much gas as possible from the existing gas and/or water pipeline into the Wilga Park power station. When the existing gas and/or water pipeline pressure is reduced as much as possible, the remaining gas will be vented through the new HDPE piping to a safe location at Tintsville Pond 2.

The existing gas and/or water pipeline will be operated in lifted water service for up to 4 weeks to transfer up to 60ML of lifted water. Operations personnel will be present at the Bibblewindi facility 24 hours per day to control all equipment and monitor the transfer. Operations personnel will also visit Tintsville Pond 2 daily to monitor the flow into the pond, in addition to using the surveillance camera. A security guard currently provides night time surveillance of the Wilga Park power station, Tintsville and Bibblewindi facilities. The security guard's route will be modified to visit Tintsville Pond 2 more frequently to ensure that the flow into the pond is continuing as expected.

3.7 Installation of Equipment – Tintsville to Bibblewindi Transfer

For the subsequent return transfer of lifted water from Tintsville Pond 2 to Bibblewindi Pond 3, a main transfer pump will be installed within the existing Wilga Park power station compound. The pump suction will be connected to the DN200 HDPE piping and the pump discharge will be connected to the existing gas and/or water pipeline, which will be positively isolated from the power station. The transfer pump is a diesel driven pump. The diesel storage tank is a double wall (self contained) steel tank with a vent and conforms to the requirements of AS 1940 and AS 1692.

A smaller booster pump may be installed at Tintsville Pond 2. The booster pump suction will be connected to a hose placed into the pond and the discharge will be connected to the DN200 HDPE piping. The booster pump is a diesel driven pump. The booster pump and main transfer pump will be installed on spill containment units with sufficient capacity to contain all fluids to prevent ground contamination from any leaks.

An air compressor will be installed within the existing Bibblewindi compressor station compound and connected to the existing gas and/or water pipeline. The air compressor will be used to pig the existing gas and/or water pipeline before and after the lifted water transfer. The air compressor is diesel driven and will also be installed on a spill containment unit with sufficient capacity to contain all fluids to prevent ground contamination from any leaks.

3.8 Cessation of Operations and Rehabilitation

Following the lifted water transfer from Tintsville to Bibblewindi, the pipeline will be flushed with fresh water to ensure that no lifted water remains in the pipeline. The aboveground carbon steel sections of the pipeline will also be dosed with biocide to ensure that no bacteria remains in the pipeline. The biocide is the same as the biocide used during drilling and has been previously approved for use. Then the pumps and air compressor will be decommissioned and removed from site. The aboveground HDPE piping will be removed and stored for possible future reuse.

3.9 Duration

Assuming a commencement date in the first quarter of 2012, it is expected that all activities associated with the transfer from Bibblewindi to Tintsville including rehabilitation will be finalised by mid 2012. Timing for the activities associated with the return transfer from Tintsville to Bibblewindi will depend upon obtaining the necessary approvals for installing additional lifted water management facilities at Bibblewindi, discharge of treated water and/or reinjection of lifted water and/or brine. Table 3-1 identifies the expected duration of activities associated with this proposal.

Table 3-2 Duration of Site Activities

Activity	Approximate Duration
▪ Installation of piping and equipment	▪ 21 days
▪ Operation - Bibblewindi to Tintsville Transfer	▪ 28 days

Activity	Approximate Duration
<ul style="list-style-type: none"> ▪ Reconfiguration of piping and equipment 	<ul style="list-style-type: none"> ▪ 7 days
<ul style="list-style-type: none"> ▪ Operation - Tintsville to Bibblewindi Transfer 	<ul style="list-style-type: none"> ▪ 28 days
<ul style="list-style-type: none"> ▪ Rehabilitation 	<ul style="list-style-type: none"> ▪ 3 days

3.10 Staff and Hours of Operation

The number of employees present on the site at any one time associated with this proposal is expected to be up to 20 persons during construction. It is not proposed to provide a workers camp on the site, with off-shift personnel to be located in nearby accommodation with travel to and from site to be provided.

Construction will occur in a daytime shift. Operation of the lifted water transfer will be on a 24-hour a day basis.

3.11 Justification of activity

Transfer of up to 60ML of lifted water from Bibblewindi Pond 3 to Tintsville Pond 2 is necessary for the ongoing management of lifted water associated with the appraisal of the hydrocarbon potential in PAL 2.

3.12 Alternatives

Bibblewindi Pond 3 is approaching capacity so some lifted water must be removed from this pond to provide sufficient freeboard for rain that may accumulate in the pond. This proposal provides the most time effective method to remove the required amount of lifted water from the pond. Alternatives include:

- Trucking lifted water from Bibblewindi Pond 3 to Tintsville Pond 2. This option is not viable because several thousand truck movements would be required to move the required amount of lifted water.
- Building a new pipeline from Bibblewindi Pond 3 to Tintsville Pond 2 to transfer the lifted water. This option is not viable because the lead time associated with designing, procuring and installing the new pipeline is too long.
- Installing additional water management facilities at Bibblewindi to treat the lifted water. This option will be progressed as a longer term solution but the lead time is too great to provide immediate relief to Bibblewindi Pond 3.
- Reinjecting the lifted water or brine to a suitable underground reservoir. This option will also be progressed as a longer term solution but the lead time is too great to provide immediate relief to Bibblewindi Pond 3.

4.0 Regulatory Context

There is a range of legislation applicable to the proposed activities which is addressed below.

4.1 Environmental Planning & Assessment Act

4.1.1 Overview

The *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) regulates development carried out in New South Wales. The carrying out of development is regulated under either Part 4 or Part 5 of the EP&A Act.

Development is required to be assessed under Part 5 of the EP&A Act if the relevant environmental planning instruments provide that the development does not require consent or is not exempt development and the development is either carried out by a determining authority or requires the approval of a determining authority.

4.1.2 State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims "to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline".

Schedule 1 of SEPP 44, which lists the LGAs to which SEPP 44 applies, includes the Narrabri LGA. SEPP 44 applies to local councils determining development applications under Part 4 of the EP&A Act. Although SEPP 44 does not apply in relation to the assessment of development under Part 5 of the EP&A Act, it has been considered in the preparation of this REF.

SEPP 44 requires that before granting development consent under Part 4 of the EP&A Act for development on land over 1 hectare in area, a consent authority must form a view as to whether the land is "potential" or "core" koala habitat. Potential koala habitat is defined as:

areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Core koala habitat is defined as:

an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

Where core koala habitat is found to occur, SEPP 44 requires that a site-specific koala plan of management be prepared.

No species of listed Koala food tree was recorded within the Wilga Park or Bibblewindi sites. These sites are therefore not considered potential Koala habitat under SEPP 44.

4.2 Environmental Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) provides that a person proposing to take an action that the person thinks may be a "controlled action" must refer the

proposal to the Minister for Sustainability, Environment, Water, Population and Communities (Minister). A "controlled action" is an action that:

- will have or is likely to have a significant impact on
 - » World heritage areas
 - » National heritage places
 - » Ramsar wetlands of international importance
 - » Commonwealth listed threatened species and communities
 - » Commonwealth listed migratory species
 - » Commonwealth marine areas
 - » The environment on Commonwealth land
 - » Great Barrier Reef Marine Park;
- Is undertaken by the Commonwealth and will have or is likely to have a significant impact on the environment;
- Is undertaken by any person on Commonwealth land and will have or is likely to have a significant impact on the environment; or
- Is a nuclear action.

These are referred to as "matters of national environmental significance" (MNES). The EPBC Act sets out the process for identifying and listing the MNES including listed threatened species and listed migratory species.

If the Minister decides that the proposed action is a controlled action, then the approval of the Minister is required under the EPBC Act.

A person proposing to take an action that the person thinks is not a controlled action may refer the proposal to the Minister for the Minister's decision whether or not the action is a controlled action. The proposed activities are not expected to have, or be likely to have, a significant impact on MNES including, in particular, listed threatened species or listed migratory species under the EPBC Act. The activity is not considered a controlled activity. On this basis, a referral to the Minister under the EPBC Act is not proposed.

4.3 Threatened Species Conservation Act

The objects of the *Threatened Species Conservation 1995* (NSW) (TSC Act) include:

- To conserve biological diversity and promote ecologically sustainable development;
- Prevent the extinction and promote the recovery of threatened species, populations and ecological communities;
- To protect the critical habitat of those threatened species, populations and ecological communities that are endangered; and
- To ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed.

The TSC Act provides the procedure for the listing of threatened species, populations and ecological communities and key threatening processes in New South Wales and the preparation and implementation of recovery plans and threat abatement plans.

The TSC Act also provides the mechanism for applying for and obtaining licences to take actions which will or are likely to result in harm to any animal that is a threatened species, population or ecological community, the picking of any plant which is part of a threatened species, population or ecological community, damage to critical habitat or damage to habitat of a threatened species, population or ecological community where such actions require a licence to be obtained.

Threatened species, populations or ecological communities are not likely to be impacted by the proposal.

4.4 National Parks and Wildlife Act

Threatened Species

Part 8A of the *National Parks and Wildlife Act 1974* (NPW Act) regulates the undertaking of activities which may impact on threatened species, populations and ecological communities listed under the TSC Act and their habitats. The NPW Act provides that a person must not harm any animal that is a threatened species, population or ecological community, pick any plant which is part of a threatened species, population or ecological community, damage any critical habitat or damage any habitat of a threatened species, population or ecological community without a licence being obtained under the NPW Act or TSC Act or unless another exception applies.

The NPW Act provides that these requirements do not apply if the action was essential for the carrying out of an activity in accordance with an approval of a determining authority under Part 5 of the EP&A Act where the determining authority has complied with Part 5.

Aboriginal Cultural Heritage

The NPW Act conserves places, objects and features of significance to Aboriginal people.

It is an offence under the NPW Act to:

- harm or desecrate an object that the person knows is an Aboriginal object except in accordance with an Aboriginal heritage impact permit;
- harm or desecrate Aboriginal objects and Aboriginal places except in accordance with an Aboriginal heritage impact permit or where the person can show they exercised due diligence to reasonably determine that no Aboriginal object would be harmed.

Clause 80B of the *National Parks & Wildlife Regulations 2009* provides defences to the strict liability offence of harming an Aboriginal object or place contained in s86(2) of NPW Act. Clause 80B (1) relevantly states (*inter alia*):

"It is a defence to a prosecution for an offence under s 86(2) of the Act, if the defendant establishes that the act or omission concerned:

(i) Was work of the following kind on land that has been disturbed:

(i) Seismic surveying,"

Clause 80B (4) states further:

"For the purposes of this clause, land is disturbed if it has been the subject of human activity that has changed the land's surface, being changes that remain clear and observable. Note: Examples of activities that may have disturbed land include the following:

(d) clearing of vegetation;

(g) Substantial grazing involving the construction of rural infrastructure.”

4.5 Native Vegetation Act

The *Native Vegetation Act 2003* (NV Act) sets a framework for:

- Encouragement of revegetation and rehabilitation of land with appropriate native vegetation;
- Providing incentives for landholders to undertake management of native vegetation on their properties; and
- An end to broad scale clearing, unless it improves or maintains the environment.

The NV Act provides three categories of native vegetation including regrowth, protected regrowth and remnant vegetation with clear definitions.

The NV Act provides greater flexibility and incentives for landholders to manage native vegetation sustainably. The Act gives effect to the Government's commitment to ending broad scale clearing unless it improves or maintains environmental outcomes.

Under section 25(g), the NV Act does not apply to any clearing that is part of an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act where the determining authority has complied with Part 5. Under section 25(m), the NV Act does not apply to any clearing authorised under the *Petroleum (Onshore) Act 1991 (NSW)*.

There will be no clearing required as part of the proposed activity.

4.6 Heritage Act

The main objective of the *Heritage Act 1977* (NSW) (Heritage Act) is to encourage the conservation of the heritage of New South Wales. It prevents impacts on "relics", which are defined as:

any deposit, artefact, object or material evidence that:

- (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
- (b) is of State or local heritage significance.

Under the Heritage Act, it is an offence to "disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit". No relics were identified during the site inspection of the sites for the proposed activities.

4.7 Protection of the Environment Operations Act

The primary objective of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) is to "protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development". The POEO Act requires entities intending on carrying out an activity declared to be a "scheduled activity" under Schedule 1 to hold an environmental protection licence (EPL) and comply with the conditions set out in the EPL.

The proposed activities are not a scheduled activity and an EPL is not required.

5.0 Environmental Impacts and Mitigation

5.1 Introduction

This section of the REF addresses the potential environmental impacts associated with the proposal and any mitigation measures required to ensure that they are appropriately managed.

5.2 Ecology

5.2.1 Flora & Fauna

Impacts

No EECs listed under the TSC Act and/or EPBC Act were recorded within the study area. The proposal will not require the removal of vegetation.

No threatened fauna or flora species listed under the TSC Act and/or EPBC Act were recorded within the study area. Additionally, the likelihood of threatened flora and fauna species occurring in the study area is considered to be low due to the cleared/disturbed nature of the sites and paucity of habitat attributes, such as hollow bearing trees within the disturbance footprints.

While the proposed pipes are located adjacent to areas that provide habitat for a range of common generalist species, the impacts to these habitats associated with the proposed activity are expected to be negligible. The installation of the pipes has the potential to temporarily impact upon resident fauna population due to noise and vibrations.

5.2.2 Matters of National Environmental Significance

An EPBC Act Protected Matters Search was undertaken using the on-line database to generate a list of those MNES) on potentially occurring within the study area and surrounds. This data, combined with other local knowledge and records, was utilised to assess whether the proposed activities will have, or are likely to have a significant impact on MNES.

Table 5-1 Matters of National Environmental Significance

Matter of National Environmental Significance	Overview
World Heritage Areas	The site is not a World Heritage area, and is not in close proximity to any such area.
Wetlands protected by international treaty (the RAMSAR convention)	The site is not a Ramsar site, and is not in close proximity to any such area.
Nationally listed threatened species, migratory species and ecological communities	No listed threatened species or migratory species were recorded within the study area. Notwithstanding, desktop searches lists a number of threatened fauna and flora species potentially occurring within the area. Whilst the presence of threatened species occurring within the area cannot be completely discounted, due to the already disturbed nature of the sites, the likelihood of impacts to threatened species is considered low.
All nuclear actions	No type of nuclear activity is proposed for the site.
Commonwealth marine areas	The proposed activity on the site will not have a significantly adverse effect on any Commonwealth marine area.

5.2.3 Key Threatening Processes

A threatening process is defined under the TSC Act as a process that threatens, or that may threaten, the survival or evolutionary development of a species, population or ecological community. Threatening processes that adversely affect threatened species, populations or ecological communities, or possibly cause others that are not currently threatened, to become threatened are listed as key threatening processes (KTPs) under the TSC, *Fisheries Management Act 1994* and EPBC Acts. KTPs relevant to the proposed activities are discussed in Table 5.2.

Table 5-2 Key Threatening Processes

Key Threatening Process	Relevance to Proposed Activities
Invasion of native plant communities by exotic perennial grasses	The study area has been previously disturbed by the introduction of exotic grasses. There exists the potential for the invasion and spread of additional weed species if machinery and vehicles contain weed seeds.
Clearing of native vegetation	There will be no clearing on native vegetation as part of this proposal.
Loss of hollow-bearing trees	No hollow bearing trees will be removed as part of this activity.
Removal of dead trees and dead wood	No dead stag trees will be removed from the study area.
Infection of native plants by <i>Phytophthora cinnamomi</i>	There exists the potential for the importation of this pathogen on unclean vehicles and plant machinery. It is recommended that all vehicles be cleaned of foreign soil from other sites to ensure that this pathogen is not introduced.

Mitigation Measures

Mitigation comprises the following:

- Operations are to be managed through the specific operational management plan prepared by the operator.
- Existing tracks should be utilised for accessing the sites.
- Weed management procedures will be implemented to prevent the spread of weeds both on and off site, including vehicle washdown as required.
- Vehicles should be washed down and cleaned of any foreign soil and seed prior to being transported on site, where they have previously been in known weed infestation, to prevent the potential spread of introduced weeds and pathogens.

5.3 Heritage

5.3.1 Aboriginal Heritage

Impacts

A search of the AHIMS was undertaken on 13 January 2012 and found that there were no items of cultural heritage located in the vicinity of either the Bibblewindi or Wilga Park portions of each project area.

A site inspection was conducted on Wednesday, 25 January 2012 by Deborah Farina, archaeologist (RPS) along the route of the pipeline. The route measures approximately three km in total, with one km of the pipeline located at Bibblewindi and two km at Wilga Park. Both portions of the pipeline route are in disturbed landscapes through previous construction, road grading and land clearance (Bibblewindi) and agricultural endeavours (Wilga Park). No Aboriginal cultural heritage sites were identified as part of the site inspection.

The following mitigation measures will be implemented.

Mitigation Measures

To limit potential impact on unknown Aboriginal sites or objects the following measures will be implemented:

- Minimise impact to areas outside the area of operation through appropriate on site heritage induction of all employees and contractors attending site.
- Vehicle access is to remain within existing tracks where possible.
- If an Aboriginal object or site is identified at any point during the proposed works, all works in the vicinity will cease immediately. That area will be temporarily fenced with high visibility tape or barrier fencing in order to prevent further impact and a suitably qualified archaeologist contacted. Works in that location will not proceed until the site has been registered with the AHIMS and an appropriate course of action determined by the archaeologist. In most instances this would involve applying for an Aboriginal Heritage Impact Permit (AHIP) from OEH in consultation with the Aboriginal Community.
- In the event that skeletal remains are uncovered, work will cease immediately in that area and the area fenced. Santos will then contact the NSW Police and follow the advised procedure. If the skeletal remains are determined to be Aboriginal, Santos will then contact the OEH and relevant Aboriginal Community Stakeholders in order to determine an action plan for the management of the skeletal remains prior to works commencing.

5.3.2 Other Cultural Heritage

Impacts

There are no Commonwealth, State or local heritage items listed in the vicinity of the Bibblewindi or Wilga Park portions of each project area. A search of the Australian Heritage Places Inventory (AHPI) showed 9 items listed for the Narrabri LGA, however, none of these items are located in the vicinity of either project area.

A search of the State Heritage Inventory, Schedule 2 of the *Narrabri Local Environment Plan 1992* and Schedule 1 of the *Narrabri Local Environmental Plan No. 2* show that there are no heritage items in the vicinity of Bibblewindi or Wilga Park portions of each project area. Accordingly, there are no constraints to the project in respect of European heritage.

Mitigation Measures

It is considered highly unlikely that any items of European cultural heritage significance will be impacted by the proposed works. Nonetheless, heritage items are protected by legislation in NSW. If an object is found during the proposed works that is considered to be of potential heritage significance, all works should cease and a qualified heritage archaeologist should be contacted to assess it.

5.4 Surface and Ground water

Impacts

The proposed activity does not involve any earthworks, drilling or trenching. Lifted water will be transferred from existing, approved lifted water storage ponds, which are sealed.

It is proposed to transfer lifted water from Bibblewindi Pond 3 to Tintfield Pond 2 as an emergency measure to reduce the risk of over-topping of Bibblewindi Pond 3. Therefore, the activity will result in a positive outcome in terms of risk to surface water quality. The transfer of lifted water will be monitored and managed to avoid spillage of lifted water.

There is potential for chemicals and fuels to spill and come into contact with watercourses or infiltrate groundwater.

There are a number of measures proposed to contain accidental spills of lifted water, chemicals, fuels and oils associated with the priming pump and main transfer pump.

With safe transfer of lifted water and the application of chemical and fuel spill containment measures, the proposed activity is very unlikely to result in any impacts on surface or groundwater quality or quantity.

Mitigation Measures

- Activities will be undertaken in accordance with good industry practice.
- Priming pump and main transfer pump will be installed on spill containment units with sufficient capacity to contain all fluids.
- A surveillance camera will be installed to monitor lifted water levels within receiving ponds during transfer of lifted water to prevent overtopping.
- Spill kits for clean up spills of chemicals, fuel, lubricants, oil etc will be provided.
- Any spills or leaks will be immediately cleaned up.
- Fuel and lubricants will be stored on site only when necessary and maintained off site whenever possible.
- Any soil that becomes contaminated through contact with lifted water, chemicals, fuels or lubricants will be removed from the site and disposed of at an appropriate licensed disposal facility.
- Where required, the maintenance and cleaning of vehicles and other equipment or plant will be carried out in areas from where the resultant contaminants cannot be released into any waters.
- All waste, including wastewater from amenities (if required) will be removed from site or managed by a licensed contractor.
- Disturbed land will be rehabilitated to pre-operational quality or better, to minimise erosion or sedimentation.

5.5 Air

Impacts

The potential for the proposed activity to introduce additional air emissions would arise from the following sources:

- vehicle movements during the installation of the piping
- venting of gas from the existing pipeline during commissioning for lifted water service;
- operation of diesel and petrol fuelled pumps and compressors; and
- vehicle movements to and from the sites.

The air emissions associated with the proposal will be dust and greenhouse gases.

The dust generated by vehicle movements is expected to be minimal. There will be no clearing required as access will be via existing tracks. The HDPE pipelines will be placed on land already cleared of native vegetation, requiring no soil disturbance. There will be minimal vehicle movements to and from sites, and safe vehicle speeds will be maintained at all times. In the context of the surrounding agricultural activities dust generation will not be a significant issue.

Potential contributions to greenhouse gases, for the duration of the activities, would be confined to the venting of gas from the existing pipeline during commissioning for lifted water service, operation of diesel and petrol fuelled pumps and compressors and vehicular traffic.

Collectively the proposed activities will result in minimal dust and greenhouse gas emissions, when compared with the agricultural activities that take place throughout the region. It is considered that the potential impacts can be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

To minimise impacts on air quality and minimise greenhouse gas emissions the following actions will be undertaken:

- Existing access tracks are to be used wherever possible.
- Vehicle speeds that are appropriate to the conditions are to be maintained.
- Land disturbance areas are to be minimised.
- Vehicles and machinery are to be maintained regularly and operated efficiently.

5.6 Noise

Impacts

Noise will be generated by the movement of vehicles during the installation and removal of the piping, vehicle movements to and from site and the operation of the pumps and compressors during the transfer of lifted water.

Installation activities will be confined to a 12 hour day during daylight hours. Operation of the lifted water transfer will be on a 24-hour a day basis. Following the installation of the pumps and compressors at Bibblewindi, it is estimated to operate for a total of up to 28 days to transfer lifted water from Bibblewindi to Tintsville. Following the removal of the pumps and compressors from the Bibblewindi site, and reconfiguration at the Tintsville/Wilga Park site, it is estimated to operate for a total of up to another 28 days to transfer lifted water from Tintsville to Bibblewindi (see Table 3-1). During these periods there will be night time noise at these respective locations resulting from pumps and compressors.

The proposed activities at Bibblewindi are very unlikely to result in any noise impacts to sensitive receivers. The nearest residence to these activities is approximately 5km (refer Figure 5-1).

Operation of the pumps at Tintsville/Wilga Park will be 900m from the closest sensitive receiver (Refer Figure 5-2). Noise monitoring will be conducted during the initial transfer from Bibblewindi to Tintsville and noise modelling will be completed to determine if additional noise attenuation will be required when the pump/s are installed at Tintsville/Wilga Park. Noise monitoring will also be conducted when the pump/s are operating at Tintsville/Wilga Park to ensure that noise is within acceptable levels.

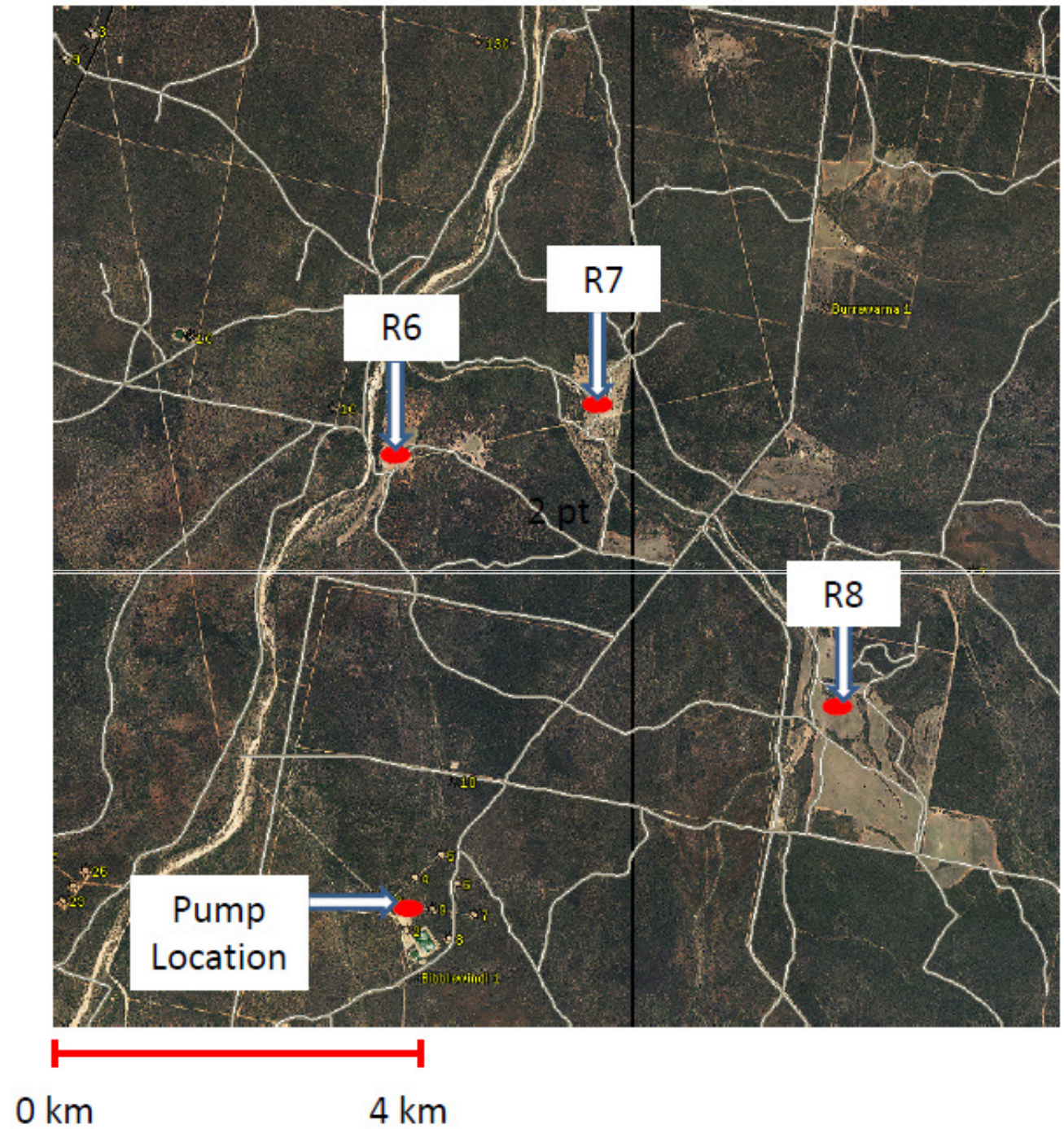
Subject to the implementation of the noise mitigation measures outlined below, the potential noise impact to the nearest residential receiver will be minimised.

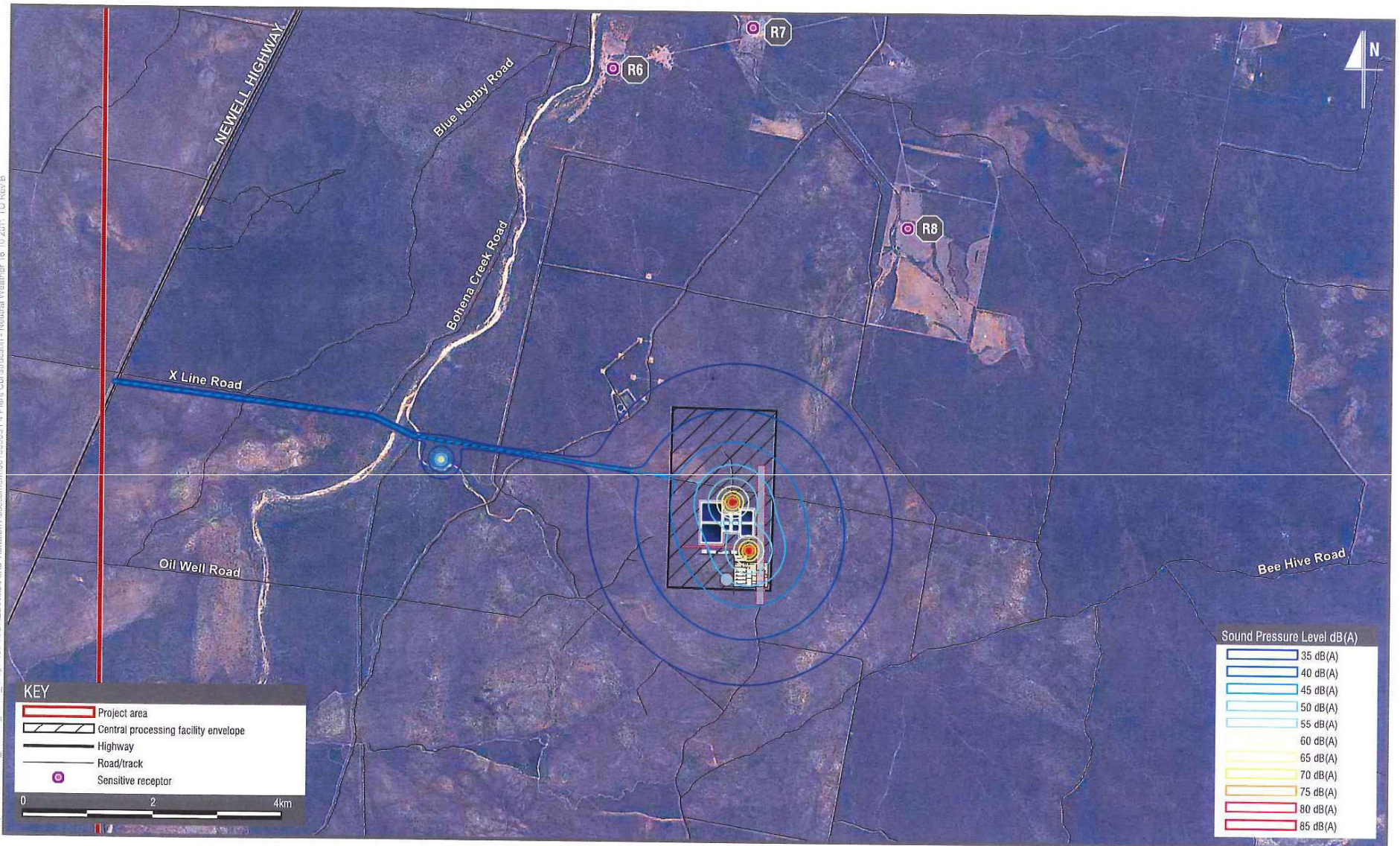
Distances to Receptors

To R6 = 5.1km

To R7 = 6.1km

To R8 = 5.2km





PLANT CONSTRUCTION - NEUTRAL WEATHER

Noise and Vibration Assessment
Narrabri Gas Project

FIGURE 4

Mitigation Measures

To minimise the potential impacts on noise the following actions will be implemented:

- Landholder notification will be given prior to commencement of operations.
- Santos will ensure that any community issues of concern will be met with a prompt response.
- Machinery and equipment will be maintained to ensure it is running efficiently.
- Noise monitoring and modelling will be completed during the initial transfer from Bibblewindi to Tintsville to determine if additional noise attenuation will be required when the pump/s are installed at Tintsville/Wilga Park.
- Noise monitoring will be conducted when the pump/s are operating at Tintsville/Wilga Park to ensure that noise is within acceptable levels.

5.7 Soil

Impacts

No new tracks will need to be constructed as part of the proposed activities. There will be no earthworks or drilling associated with the proposal. Therefore, there is a very small potential risk of soil erosion resulting in sediment transport to local waterways.

There is also a small potential risk of soil contamination as a result of the proposed activities, both from spillage of lifted water, and of hazardous materials such as chemicals, fuels and lubricants.

It is considered that the potential impacts associated with soils can be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

The erosion and sediment control measures are proposed as follows:

- Existing ground cover will be maintained where possible.
- Any disturbed area will be rehabilitated upon completion of activities.

Mitigation measures to reduce the risk of soil contamination are the same as those listed to mitigate potential contamination of surface and groundwater (Section 5.4). In addition to implementing these measures:

- Any soil that becomes contaminated through contact with lifted water, chemicals, fuels or lubricants will be removed from the site and disposed of at an appropriate licensed disposal facility.

5.8 Chemical and Hazardous Substances Management

Impacts

The proposed activity will require the movement of lifted water and the use of chemicals, fuels and lubricants. While these substances are not considered highly hazardous, there is still the potential risk of fire and contamination of land and water if an accidental spillage was to occur.

It is considered that the potential impacts associated with chemical and hazardous substances can be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

To mitigate the risk of a lifted water spill during the transfer, the following measures will be implemented:

- Engineering design of transfer equipment and piping will be in accordance with good industry practice.
- A HAZOP study of the lifted water transfer will be undertaken.
- The existing gas and/or water pipeline will be pigged with fresh water and visually inspected post pigging before lifted water is introduced into the pipeline (note that a pressure test survey and a leakage survey of the existing gas and/or water pipeline was completed when it was constructed in 2009).
- Detailed operating procedures will be developed before the transfer commences and followed during the transfer.
- Emergency management procedures will be developed before the transfer commences and followed if a spill or other emergency occurs.
- The HDPE piping and the existing gas and/or water pipeline will be visually inspected after the lifted water transfer commences.
- Surveillance cameras will monitor the discharge of lifted water into the receiving pond.
- Operations personnel will monitor and control the transfer 24 hours per day.

Other relevant mitigation measures are the same as those listed to mitigate potential contamination of surface and groundwater (Section 5.4), and Soils (Section 5.7). To avoid duplication, these measures have not been listed here.

5.9 Contaminated land

Impacts

The proposed activity does not involve any earthworks. Disturbance of contaminated land will not occur as a result of the proposed activity.

It is considered that the potential contamination will be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

Mitigation measures identified in Sections 5.4 and 5.7 will ensure that any contamination risk is appropriately managed.

5.10 Waste Minimisation and Management

Impacts

General construction and operational waste will be produced as part of the proposed activities. These will be managed in an appropriate manner to avoid health risks and contamination of land and waterways.

A regular service of amenities will be conducted and waste is to be removed to a licensed facility.

It is considered that the potential impacts associated with waste can be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

- A general waste management strategy based upon the principles of reduce, reuse and recycling will be implemented.
- All staff and contractors will be made aware of waste management procedures during induction.
- Appropriate waste containers will be provided on the site.
- Any waste generated is to be disposed of in an appropriate manner in accordance with relevant standards and guidelines.
- Spills of waste material shall be dealt with in a prompt and thorough manner, and reported to the appropriate authority if necessary.
- General refuse will be collected and transported to an approved recycling or disposal site.
- Onsite waste disposal will be prohibited.
- Hazardous waste will be managed in accordance with existing guidelines and standards.

5.11 Natural Resource Use

Impacts

The key natural resources that would be affected by the proposed activities are agricultural land resources, forestry resources and fuels for the proposed operations and transportation of staff.

The Tintfield site is part of an agricultural property, and the Bibblewindi site is within already disturbed land within Bibblewindi State Forest. The locations of the pumps, compressors and pipes are temporary and have been selected to minimise direct impacts on land resources.

Fuels will be used for equipment and also for works and staff vehicles although this is not likely to be a significant quantity of fuel use.

It is considered that the potential impacts associated with natural resource use are insignificant and do not require specific mitigation measures.

5.12 Local Community & Neighbouring Properties

Impacts

Santos are committed to being good neighbours and to consult with the community and other stakeholders.

The proposed activities are temporary and will be undertaken in areas already subject to disturbance. The impacts of the proposed activity on the local community and neighbouring properties are considered to be minimal.

It is considered that the potential impacts associated with the local community and neighbouring properties can be appropriately managed if the mitigation measures presented below are implemented.

Mitigation Measures

In order to minimise impacts on landholders the following measures will be implemented:

- Undertake ongoing landholder and stakeholder consultation.
- Respond promptly to any community concerns or complaints.

- Inform the community promptly of any changes to timing or scheduling which will have an adverse impact on them.

5.13 Visual Impact

Impacts

The visual impacts of the proposal will be minimal due to the temporary nature of the activity, the current land uses in the areas affected, the minimal disturbance that will occur during construction and operation, and the rehabilitation of any areas that may be disturbed.

Mitigation Measures

No specific measures are proposed.

5.14 Land use

Impacts

The Tintfield site is part of an agricultural property, and the Bibblewindi site is within already disturbed land within Bibblewindi State Forest. The locations of the pumps, compressors and pipes are temporary and have been selected to minimise direct impacts on land use.

The pipe may temporarily create a barrier to vehicular movement and the convenient access to portions of land. The HDPE pipeline crosses an existing access track between Tintfield Pond 2 and Wilga Park Power Station; however, this track is currently not in use. This access track will be temporarily closed during the proposed activity, with alternative access available via a longer route.

It is considered that the potential impacts associated with land use are negligible.

Mitigation Measures

No specific measures are proposed.

5.15 Cumulative Environmental Impacts

The proposed activity is an emergency measure to manage risks associated with lifted water management and is temporary. The installation and operation of the facility occurs within the context of other coal seam gas facilities and agricultural land uses.

With the application of the mitigation measures identified above, the activity's contribution to negative cumulative environmental impacts is considered minimal.

5.16 Summary of Mitigation Measures

The following table provides an overview of the mitigation measures recommended in Section 5. It is considered that all potential impacts identified in this section can be appropriately managed if these mitigation measures are implemented.

Table 5-3 Summary of Mitigation Measures

Potential Impact	Proposed Mitigation Measure
Ecology	<ul style="list-style-type: none"> ▪ Operations are to be managed through the specific operational management plan prepared by the operator. ▪ Existing tracks should be utilised for accessing the sites. ▪ Weed management procedures will be implemented to prevent the spread of weeds both on and off site, including vehicle washdown as required. ▪ Vehicles should be washed down and cleaned of any foreign soil and seed prior to being transported on site, where they have previously been in known weed infestation, to prevent the potential spread of introduced weeds and pathogens.
Aboriginal Heritage	<ul style="list-style-type: none"> ▪ Minimise impact to areas outside the area of operation through appropriate on site heritage induction of all employees and contractors attending site. ▪ Vehicle access is to remain within existing tracks where. ▪ In the event that any vegetation clearing is required to allow large machinery access to a given area, soil disturbance will be kept to a minimum. Subject to ecological constraints, vegetation will be cut with a chain saw rather than bulldozed, and trees and bushes will be cut at their base just above ground level where possible. ▪ If an Aboriginal object or site is identified at any point during the proposed works, all works in the vicinity will cease immediately. That area will be temporarily fenced with high visibility tape or barrier fencing in order to prevent further impact and a suitably qualified archaeologist contacted. Works in that location will not proceed until the site has been registered with the AHIMS and an appropriate course of action determined by the archaeologist. In most instances this would involve applying for an Aboriginal Heritage Impact Permit (AHIP) from OEH in consultation with the Aboriginal Community. ▪ In the event that skeletal remains are uncovered, work will cease immediately in that area and the area fenced. Santos will then contact the NSW Police and follow the advised procedure. If the skeletal remains are determined to be Aboriginal, Santos will then contact the OEH and relevant Aboriginal Community Stakeholders in order to determine an action plan for the management of the skeletal remains prior to works commencing.
Other Heritage	<ul style="list-style-type: none"> ▪ If an object is found during the proposed works that is considered to be of potential heritage significance, all works should cease and a qualified heritage archaeologist should be contacted to assess it.
Surface and Groundwater	<ul style="list-style-type: none"> ▪ Activities will be undertaken in accordance with good industry practice. ▪ Priming pump and main transfer pump will be installed on spill containment units with sufficient capacity to contain all fluids. ▪ A surveillance camera will be installed to monitor lifted water levels within receiving ponds during transfer of lifted water to prevent overtopping. ▪ Spill kits for clean up spills of chemicals, fuel, lubricants, oil etc will be provided. ▪ Any spills or leaks will be immediately cleaned up. ▪ Chemicals, fuel and lubricants will be stored on site only when necessary and maintained off site whenever possible.

Potential Impact	Proposed Mitigation Measure
	<ul style="list-style-type: none"> ▪ Any soil that becomes contaminated through contact with lifted water, chemicals, fuels or lubricants will be removed from the site and disposed of at an appropriate licensed disposal facility. ▪ Where required, the maintenance and cleaning of vehicles and other equipment or plant will be carried out in areas from where the resultant contaminants cannot be released into any waters. ▪ All waste, including wastewater from amenities (if required) will be removed from site or managed by a licensed contractor. ▪ Disturbed land will be rehabilitated to pre-operational quality or better, to minimise erosion or sedimentation.
Air	<ul style="list-style-type: none"> ▪ Existing access tracks are to be used wherever possible. ▪ Vehicle speeds that are appropriate to the conditions are to be maintained. ▪ Land disturbance areas are to be minimised. ▪ Vehicles and machinery are to be maintained regularly and operated efficiently.
Noise	<ul style="list-style-type: none"> ▪ Landholder notification will be given prior to commencement of operations. ▪ Santos will ensure that any community issues of concern will be met with a prompt response. ▪ Machinery and equipment will be maintained to ensure it is running efficiently. ▪ Noise monitoring and modelling will be completed during the initial transfer from Bibblewindi to Tintfield to determine if additional noise attenuation will be required when the pump/s are installed at Tintfield/Wilga Park. ▪ Noise monitoring will be conducted when the pump/s are operating at Tintfield/Wilga Park to ensure that noise is within acceptable levels.
Soils	<ul style="list-style-type: none"> ▪ Existing ground cover will be maintained where possible. ▪ Any disturbed area will be rehabilitated upon completion of activities. ▪ Any soil that becomes contaminated through contact with lifted water, fuels or lubricants will be removed from the site and disposed of at an appropriate licensed disposal facility.
Chemical and Hazardous Substances	<ul style="list-style-type: none"> ▪ Engineering design of transfer equipment and piping will be in accordance with good industry practice. ▪ A HAZOP study of the lifted water transfer will be undertaken. ▪ The existing gas and/or water pipeline will be pigged with fresh water and visually inspected post pigging before lifted water is introduced into the pipeline (note that a pressure test survey and a leakage survey of the existing gas and/or water pipeline was completed when it was constructed in 2009). ▪ Detailed operating procedures will be developed before the transfer commences and followed during the transfer. ▪ Emergency management procedures will be developed before the transfer commences and followed if a spill or other emergency occurs. ▪ The HDPE piping and the existing gas and/or water pipeline will be visually

Potential Impact	Proposed Mitigation Measure
	<p>inspected after the lifted water transfer commences.</p> <ul style="list-style-type: none"> ▪ Surveillance cameras will monitor the discharge of lifted water into the receiving pond. ▪ Operations personnel will monitor and control the transfer 24 hours per day. <p>Other relevant mitigation measures are the same as those listed to mitigate potential contamination of surface and groundwater (Section 5.4), and Soils (Section 5.7).</p>
Contamination	<p>Mitigation measures identified in Sections 5.4 and 5.7 will ensure that any contamination risk is appropriately management.</p>
Waste	<ul style="list-style-type: none"> ▪ A general waste management strategy based upon the principles of reduce, reuse and recycling will be implemented. ▪ All staff and contractors will be made aware of waste management procedures during induction. ▪ Appropriate waste containers will be provided on the site. ▪ Any waste generated is to be disposed of in an appropriate manner in accordance with relevant standards and guidelines. ▪ Spills of waste material shall be dealt with in a prompt and thorough manner, and reported to the appropriate authority if necessary. ▪ General refuse will be collected and transported to an approved recycling or disposal site. ▪ Onsite waste disposal will be prohibited. ▪ Hazardous waste will be managed in accordance with existing guidelines and standards.
Natural Resource Use	<p>No specific measures are proposed.</p>
Community	<ul style="list-style-type: none"> ▪ Undertake ongoing landholder and stakeholder consultation. ▪ Respond promptly to any community concerns or complaints. ▪ Inform the community promptly of any changes to timing or scheduling which will have an adverse impact on them.
Visual	<p>No specific measures are proposed.</p>
Land Use	<p>No specific measures are proposed.</p>

5.17 Clause 228 Guidelines

Clause 228 of the EP&A Regulation states that for the purpose of Part 5 of the EP&A Act the following factors are to be taken into account concerning the impact of an activity on the environment. These factors are considered in Table 5-4.

Table 5-4 Clause 228 Guidelines

Factor	Impact
<i>Any environmental impact on the community</i>	Negligible impact.
<i>Any transformation of a locality</i>	Negligible impact.
<i>Any environmental impact on the ecosystems of the locality.</i>	Negligible impact.
<i>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality</i>	Negligible impact.
<i>Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations</i>	Negligible impact.
<i>Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)</i>	Nil
<i>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air</i>	Negligible impact.
<i>Any long-term effects on the environment</i>	Nil.
<i>Any degradation of the quality of the environment</i>	Negligible impact.
<i>Any risk to the safety of the environment</i>	Minor short term negative. The proposal may result in short term potential risks to the safety of the environment due to incidents and spills.
<i>Any reduction in the range of beneficial uses of the environment</i>	Nil. The footprint of activities for the proposal would not result in any reduction in the range of beneficial use of the environment.
<i>Any pollution of the environment</i>	Negligible impact. The proposal may result in short term potential risk of pollution of the environment due to incidents and spills.
<i>Any environmental problems associated with the disposal</i>	Negligible impact.

Factor	Impact
<i>of waste</i> <i>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply</i>	Negligible impact.

6.0 Conclusions

RPS has prepared this REF on behalf of Santos to assess the environmental impact of the proposed temporary installation of high-density polyethylene (HDPE) piping and pumps to enable 60 ML of lifted water to be transferred from the existing Bibblewindi Pond 3 located at the Bibblewindi lifted water management plant in PAL 2, through an existing gas and/or water pipeline, to the existing Tintfield Pond 2 located near the Wilga Park power station in PEL 238.

Site assessment has been undertaken to assist in guiding the location of pipeline, so to minimise impacts on the environment. A site inspection and assessment was undertaken for ecology.

Consideration has also been given to a range of environmental impacts, including air, surface water, soils, chemical and hazardous substances management, contaminated land, waste minimisation and management, natural resources, local community and neighbouring properties, visual impacts, land use and cumulative environmental effects.

This REF has been prepared in accordance with Clause 228 of the *Environmental Planning and Assessment Regulation 2000* and provides consideration of the environmental impact of the proposed works as required by Section 111 of the *Environmental Planning and Assessment Act 1979*. The proposal comprises temporary activities, located in areas to minimise environmental risks. The REF has identified that the proposed installation of the temporary pipeline and subsequent transfer of lifted water are not likely to significantly affect the environment or threatened species, populations or ecological communities or their habitats.