



**PEL 12**  
**LONGLEA NO 1 PUMP TEST**  
**SUPPLEMENTARY MANAGEMENT PLAN**

*(to be determined under Part 5 of the Environmental Planning & Assessment Act 1979)*

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## 1. Overview

### Introduction

The 'Proposed Coalbed Methane Exploration Drilling Programme ACM Longlea No 1 situated within Petroleum Exploration Licence (PEL) No 12 Review of Environmental Factors (REF) (refer Attachment 1) was lodged in March 2005 by Earth Resources Australia Pty Ltd for and on behalf of the titleholder Australian Coalbed Methane Pty Ltd and subsequently approved by the NSW Department of Primary Industry 29 June 2005 under Part 5 of the *Environmental Planning & Assessment Act 1979 (EP&A Act)*. This approval allowed for a pump test to be undertaken for 24 hours duration at the Longlea 1 wellbore. The approval letter contained additional obligations under which the Longlea pump test should be undertaken.

Santos QNT Pty Ltd (Santos) as Operator of PEL 12 for and on behalf of the title holders now proposes to conduct the pump test for a period of up to 12 weeks and seeks an extension of the approval until 30 June 2010. The basis of this Supplementary Management Plan is to satisfy the requirements of Section 111 of the EP&A Act. This Supplementary Management Plan describes the proposal and the associated environmental impacts in the context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000*. The factors identified in Clause 228 have been addressed in Section 6 of this document.

The proposed activities will enable quantification of the coal seam gas (CSG) productive potential of the Breeza and Hoskissons coals, and will be undertaken in accordance with the approved REF (June 2005) and additional documentation provided herewith.

### Work programme summary

The proposed work programme will be conducted in four stages:-

#### Stage 1 – Prepare Longlea 1 for pump test

- Re-enter the Longlea 1 wellbore and install a wellhead onto the existing casing stub to enable the work programme to be conducted with full pressure control ensuring safe operations and the ability to shut-in the well at any time
- Confirm casing integrity and the Breeza and Hoskissons coal seams are accessible
- Install a Progressive Cavity Pump ("PCP")

#### Stage 2 – Installation and commissioning of surface facilities

- Install surface pumping, monitoring and water gathering facilities within the designated lease area.
- Install an above ground tank to receive produced water.

#### Stage 3 – Pump test

- Conduct the pump test for a period of approximately 12 weeks on a 24 hour seven days per week basis.

#### Stage 4 – Water Management

- Accurately quantify the produced water parameters whilst ensuring safe pumping, temporary storage, transport and disposal.

#### Stage 5 – Review of results and de-activation of the site

- Review results of pump test.
- Assess implications for coal seam gas potential and future activities.

## 2. Description of Pump Test

### Stage 1

These activities are designed to confirm that the wellbore is capable of being pump tested and to place the well in a condition to be tested.

- Prepare lease to enable access.
- Prepare well for activities.
  - Hot tap below welded plate to install a valve to bleed-off any pressure if present in the wellbore. This will also be used to pump water into to maintain pressure control.
  - Cut the cap off the top of the casing using a water cutter.
  - Install a bradenhead.
- Confirm condition of wellbore.
  - Mobilise a logging truck to run a drift to TD and run a GR-CBL wireline log (may require a crane) to ensure the condition of the wellbore is as currently understood.
  - Nipple up Christmas tree and suspend well for pump installation as per Appendix A Figures 1 and 2.
- Install Pump for Test (refer Appendix A Figure 2)
  - Mobilise a workover rig to site.
  - Nipple down on Christmas tree and install BOP.
  - Run 3-1/2" tubing complete with PCP stator.
  - Run sucker rods and PCP rotor.
  - Install drivehead.
  - Release Rig.

### Stage 2

Install surface facilities to enable pump test to be undertaken. The indicative lease layout is shown in Appendix A Figure 3. Items to be installed are:

- Diesel Gen Set.
- Diesel storage tank.
- Variable speed drive.
- RTU (Remote Terminal Unit) – this monitors and controls all instruments.
- Water storage tank (300 kl).
- Tubing pressure transmitter.
- Annulus pressure transmitter.
- Annulus back pressure regulator.
- Vent/flare stack.
- Water flow meter.
- Commission and handover to a production operator.

### Stage 3

#### Conduct the Pump Test

- The pump test will also provide Santos with an understanding of specific reservoir properties such as permeability, reservoir pressure and connected fluid volume. These properties will materially affect potential project economics which require an understanding of well deliverability, water decline rates and volumes, quality and dewatering time and well spacing. The pump test will assist in optimising future pilot programme planning and design.

This will include:

- Regular measurement of water quality and produced volumes
- Removal of produced water and delivery of to a licensed facility

### Stage 4

Water Management Plan – refer to clause 5.2 on page 15 of this document.

### Stage 5

- Upon obtaining sufficient data cease testing, de-activate site pending assessment of results. Rehabilitation of the site will be undertaken in discussion with the landholder.

### 3. Potential Impacts and Management Controls

The potential environmental impacts associated with the Project, the management controls and the performance management indicators are discussed below. The focus of environmental management will be to firstly avoid where possible, then minimise and mitigate any impacts. All activities will be planned in consultation with landholders so that potential impacts (e.g. lighting, noise, weeds) are avoided and/or controlled.

#### Risk Assessment

A Risk Matrix was used to determine the risk rating for each of the environmental elements identified as potentially being impacted. The risk ratings were determined prior to applying mitigation strategies and safeguards and then after considering measures to reduced risk. The unmitigated risk rating and residual risk ratings are both provided and ranged from a 1-3, which means that the risk identified can be managed through routine monitoring and procedures.

**Aspect, Potential Impacts, Unmitigated Risk Rating, Management Controls, Residual Risk Rating, Performance Indicator and Records**

Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
<b>Air Quality</b>	<p>Expected air emissions / air quality issues associated with the short term activities may include:</p> <ul style="list-style-type: none"> <li>▪ Combustion exhausts from the flare stack (during testing);</li> <li>▪ Fugitive emissions from (vehicles); and</li> <li>▪ Dust emissions from earthworks and vehicular activity.</li> </ul> <p>Dust levels should not be significant enough to present a health hazard, but may in some circumstances cause a decrease in visual amenity.</p> <p>Fugitive emissions from vehicles used during appraisal activities are anticipated to be minor due to the small scale of activities planned.</p> <p>Other minor sources of air emissions include exhaust fumes from earthmoving and transport equipment. These sources are likely to be negligible in the context of existing activities including grazing and transport within the area. No measurable impact is likely.</p>	<b>1</b>	<p>The following standards related to air quality are part of the Santos EHSMS:</p> <ul style="list-style-type: none"> <li>▪ EHS05 – Air Emissions; and</li> <li>▪ EHS06 –Greenhouse Gas Management.</li> </ul> <p>These standards outline Company requirements for the management of air emissions and the accounting, reporting and reduction of greenhouse gas emissions from Santos operated facilities.</p> <p>In accordance with these Standards and the Santos Greenhouse Policy, Santos annually reports all air pollutant and greenhouse gas emissions to the National Pollutant Inventory (NPI) and the Commonwealth Government Greenhouse Challenge Programme.</p> <p>Santos may apply one or more of the following dust suppression methods depending on the severity of the situation:</p> <ul style="list-style-type: none"> <li>▪ Reducing the speed of vehicles on field roads.</li> <li>▪ Watering of roads when appropriate or when agreed.</li> <li>▪ Investigating dust complaints and responding appropriately.</li> </ul> <p>Planning the location of activities in consultation with landholders should control impacts.</p>	<b>1</b>	<p>Minimal complaints from Landholders regarding dust impacts.</p> <p>Amicable resolution of complaints.</p>	<p>All complaints made by the Landholder and any subsequent actions are to be recorded in the Complaints Register.</p>
<b>Water-Surface and Groundwater</b>	<p>Potential impacts associated with further development of the area are:</p> <ul style="list-style-type: none"> <li>▪ Release of oils or other chemicals maintenance fluids; and</li> <li>▪ Transport of sediments disturbed by erosion</li> </ul>	<b>2</b>	<p>The following management strategies will be implemented.</p> <ul style="list-style-type: none"> <li>▪ Water removed from site will be managed by a contractor licensed to carry and handle water.</li> </ul>	<b>1</b>	<p>No surface or ground water contamination.</p> <p>Water will be managed in accordance with section 5.4.2 of the REF.</p>	<p>Records of spills, leaks and associated clean ups are to be managed using the Incident</p>

Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
	<p>of soils during construction activities. Movement of Associated water into surface or ground water.</p>		<ul style="list-style-type: none"> <li>▪ Bunding of all areas storing or handling fuel, fuel using equipment, and chemicals, in line with Australian Standard 1940 – 1993; The Storage and Handling of Flammable and Combustible Liquids</li> <li>▪ Where applicable maintenance of roads, drains, bund walls, contour and diversion banks, will occur. All drainage structures are to be maintained for the life of the development.</li> <li>▪ Maintenance is carried out on an as needed basis - based on field observations of the Field Operations personnel.</li> <li>▪ During rehabilitation, diversion banks and ripping along the contour will be completed to prevent the concentration and momentum of water flow as required.</li> </ul>		<p>Diversion mechanisms in place, regularly checked and maintained to redirect natural stormwater movement where required.</p> <p>Control of water movement and seepage monitored.</p> <p>Controlled erosion</p>	<p>Management System.</p> <p>Maintenance carried out to remedy any erosion and water channelling is to be recorded using the Incident Management System.</p> <p>Records of water storage inspections to be maintained.</p>
<b>Noise</b>	<p>Activities to be undertaken during 24 hour 7 day a week drilling operations include drilling, running casing and cementing, core analysis and geophysical logging.</p> <p>.All activities apart from access to the site are confined to the drill pad with all work carried out during two 12 hour shifts. Main vehicle movements are based around personnel shift change outs. There are however the occasional deliveries and other personnel accessing the site outside of these times. These movements will be restricted to reasonable daylight hours or for emergency requirements during night time activities.</p> <p>Initial site preparation and rehabilitation of the drill pad will be undertaken during daylight hours.</p>	2	<p>To manage noise and minimise impacts the following management strategies/controls will be implemented:</p> <ul style="list-style-type: none"> <li>▪ Landholder notification will be given prior to commencement of drilling.</li> <li>▪ Equipment will be maintained so that noise levels remain constant.</li> <li>▪ Complaints will be responded to in a timely manner.</li> </ul>	1	<p>All noise complaints will be recorded in the Complaints Register.</p> <p>Amicable resolution of complaints</p> <p>Where noise disturbance cannot be avoided, Santos will investigate alternative arrangements to suit the landholder.</p>	<p>Maintenance carried out on equipment is to be recorded.</p> <p>All complaints made and any subsequent action is to be recorded within the Complaints Register.</p>



Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
<p><b>Light Disturbance</b></p>	<p>Temporary lighting is required at the well sites for night-time drilling activities. Drilling activities are on a 24 hour basis and require adequate lighting to ensure visibility is maintained to allow safe operations. Light spillage is minimal due to the focused nature of the lighting arrangements, with the illumination reducing outside of lighting tower range. Santos considers the offsite impacts to be minimal as drilling operations are of a temporary nature and short term.</p> <p>Potential impacts related to light disturbance are:</p> <ul style="list-style-type: none"> <li>▪ Disturbance to landholder at night</li> <li>▪ Visual impact on nearby sensitive receptors.</li> </ul>	<p>2</p>	<ul style="list-style-type: none"> <li>▪ The placement of lease sites is conducted in consultation with the landholder and the potential for light disturbance is addressed in the scouting process. If light disturbance is considered to be a potential impact site specific mitigation controls are adopted for the lease site. These mitigation controls could include, but is not limited to:                             <ul style="list-style-type: none"> <li>○ Redirection of light towers</li> <li>○ Angling of lights to be more directed at the ground</li> </ul> </li> <li>▪ Due to the small number of sensitive receptors and the opportunity to plan appraisal activities with landowners, it is anticipated that minimal impact will occur.</li> <li>▪ Complaints will be responded to in a timely manner.</li> <li>▪ Construction works will be conducted during daylight hours. Drilling activities are 24 hour operations; however landholder notification is given prior to commencement of drilling.</li> </ul>	<p>1</p>	<p>All light disturbance complaints will be recorded in the Complaints Register.</p> <p>Where Light disturbance cannot be avoided, Santos will investigate alternative arrangements to suit the landholder.</p>	<p>All complaints made and any subsequent action is to be recorded within the Complaints Register.</p>
<p><b>Waste</b></p>	<p>No waste will be stored on site.</p>	<p>1</p>	<p>The Santos EHSMS Standard related to waste management is EHS04 – Waste Management. This standard covers the requirements for the management of waste within Santos QNT operated facilities.</p> <p>The following mitigation measures shall be used in waste management:</p> <ul style="list-style-type: none"> <li>▪ The EHS04 – Waste Management Standard shall be followed to ensure appropriate mitigation measures are implemented in the management of waste.</li> </ul>	<p>1</p>	<p>Quantity of waste disposed.</p> <p>Waste is disposed of at appropriate end point.</p> <p>Post construction checks to ensure all waste has been appropriately removed and disposed of.</p>	<p>All waste that is generated and moved off-site will be recorded.</p> <p>All waste management non-compliances are managed in the Incident Management System.</p>

Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
			<ul style="list-style-type: none"> <li>▪ General and recyclable wastes (including glass, paper and plastic) generated during construction will be transported to landfill and recycling facilities on a routine basis.</li> <li>▪ Any regulated waste will be collected by licensed contractors for off-site disposal.</li> <li>▪ Complaints are addressed in a timely manner.</li> </ul>		Operational checks to establish that all waste has been appropriately removed from the operational areas, or correctly stored and waiting for removal.	Any complaints from the landholders regarding waste management are recorded in the Complaints Register.
<b>Land, Soils and Terrain</b>	It is considered that the only potential environmental impact associated with the activities is soil erosion.	2	<p>All activities associated with land disturbance will be discussed with the Landholder prior to commencement.</p> <ul style="list-style-type: none"> <li>▪ An environmental assessment will be carried out prior to the acceptance of a site for a new activity. This assessment determines landholder values, habitats, vegetation, and areas of significant environmental/cultural value to be avoided. The assessment also outlines areas or issues requiring particular environmental management.</li> </ul>	1	<p>The site will be rehabilitated for operational purposes and upon closure of the field.</p> <p>The area of all disturbances will be determined and placed within Santos' Geographic Information System (GIS).</p>	Records of disturbance are maintained within Santos' GIS.
<b>Flora, Fauna and Environmental Sensitive Areas</b>	The proposed location has previously been highly disturbed by agricultural activities. The environmental value is negligible.	1	<ul style="list-style-type: none"> <li>▪ Use of areas already disturbed</li> <li>▪ It is intended that petroleum activities will be confined where possible to existing cleared lands.</li> <li>▪ No unplanned or unapproved damage to flora and fauna.</li> <li>▪ Restoration of disturbed areas to commence as soon as practical.</li> </ul>	1	Ongoing monitoring will be undertaken to assess the success and integrity of construction and rehabilitation measure and ensure appropriate follow-up rehabilitation measures are implemented.	<p>Santos will maintain records during construction and operation of all monitoring and assessment activities.</p> <p>Recommendations and corrective actions arising from audits and reviews will be implemented.</p>

Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
						Routine work reports will be recorded and reviewed by each supervisor or manager.
<b>Weed Management</b>	There is a potential for transmission of weeds through earthworks equipment and general traffic.	<b>3</b>	<p>Santos has in place EHS09 Weeds and Pest Animal Control that outlines the requirements for weed management.</p> <p>The following are key items from the weed management plan:</p> <ul style="list-style-type: none"> <li>▪ All vehicles coming from declared weed infested to non-declared weed areas are required to utilise vehicle washing facilities or any temporary washing facilities established for this purpose.</li> <li>▪ All equipment entering an area not already infested with declared weeds shall follow the Environment Hazard Standard EHS09: Weed and Pest Control and the Field Weed Management Plan.</li> <li>▪ All vehicle movements are restricted to defined areas agreed upon with the Landholder/s.</li> <li>▪ Soil and gravel from known declared weed infested areas is not to be used in weed free areas.</li> <li>▪ Land disturbance is to be minimised to prevent the germination of weed seeds that may already exist in the soil.</li> <li>▪ If a declared weed or weed of concern is discovered, it shall be collected in accordance with the Environment Hazard Standard EHS09: Weed and Pest Control and EHS09 Appendix A: Weed and Pest Animal Identification</li> </ul>	<b>2</b>	<p>All land disturbed by Santos is to be returned to a condition consistent with the adjacent area at the end of the rehabilitation process.</p> <p>Identify and document areas of new weed infestations in the Incident Management System.</p>	Vehicle Records are to be inspected at the time of site entry to verify that vehicles and equipment from a weed infested area have been appropriately washed down.

Aspect	Potential Impacts	UM RR	Management Controls	RRR	Performance Indicator	Records
			Procedure. <ul style="list-style-type: none"> <li>▪ Field staff will monitor new and pre-existing infestations in.</li> </ul>			
<b>Community</b>	The primary contact during planning and development will be with the Landholder. The activities have the potential to impact upon landholders. In general, land access will be addressed in compensation/access agreements prior to the commencement of petroleum activities.	2	The management strategies will include: <ul style="list-style-type: none"> <li>▪ Access will be discussed with the Landholder during the field scouting period and compensation finalised.</li> <li>▪ Land requirements and locations for infrastructure will be discussed during the pilot design period with the Landholder. Where practical infrastructure will be located within previously disturbed areas. Land requirements will be minimised to that required for safe operations.</li> <li>▪ Land no longer required for normal operations will be rehabilitated and where practical returned to its previous use in consultation with the Landholder.</li> </ul>	1	All land disturbed by Santos is to be returned to a condition consistent with the adjacent area and in consultation with the landholder.	Santos records contracts with landholders.
<b>Indigenous and Non-Indigenous Cultural Heritage</b>	Indigenous heritage. Site or artefact of indigenous culture may be inadvertently damaged.  Non-Indigenous Heritage: Sites or artefacts of non-indigenous settlement may be inadvertently damaged.	1	<ul style="list-style-type: none"> <li>▪ Development will occur in cleared/disturbed areas.</li> </ul>	1		Records of any cultural heritage site are maintained.

UMRR = Unmitigated Risk Rating

RRR = Residual Risk Rating

## 4. Clause 228 Checklist

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

Factor	Positive/Negative Impact
<p><i>Any environmental impact on the community</i></p> <p>The proposed site lies approximately 29 km west of Gunnedah and 10 km north east of Mullaley. The closest receptor is approximately 650 m from the site.</p> <p>Minor short term impacts such as noise would be experienced. Safeguards proposed in Section 3 would minimise these impacts.</p>	Short term negative.
<p><i>Any transformation of a locality</i></p> <p>There would be localised and non-permanent impact on the immediate vicinity of the hole for the duration of the programme. Safeguards proposed in Section 3 would minimise these impacts.</p>	Short term negative
<p><i>Any environmental impact on the ecosystems of the locality</i></p> <p>The area of proposed activities is highly disturbed, no environmental impacts of the ecosystems of the locality would occur as a result of the project.</p>	Nil
<p><i>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality</i></p> <p>During construction there may be a reduction in these values due to affecting visual amenity. Given the short term nature of activities and the safeguards/mitigation in Section 3 the reduction is considered negligible.</p>	Nil
<p><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></p> <p>No locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations occur near the proposal area.</p>	Nil
<p><i>Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974 )</i></p> <p>The proposal would not impact on the habitat of protected fauna.</p>	Nil
<p><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></p> <p>The proposal would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.</p>	Nil
<p><i>Any long-term effects on the environment</i></p> <p>The proposal would have no long-term effects on the environment</p>	Nil
<p><i>Any degradation of the quality of the environment</i></p> <p>There is potential for minor short term environmental degradation due to noise impacts. Safeguards proposed in Section 3 would minimise these impacts.</p>	Minor short term negative

Factor	Positive/Negative Impact
<p><i>Any risk to the safety of the environment</i></p> <p>The proposal may result in short term potential risks to the safety of the environment due to potential accidents and spills. The likelihood of incidents occurring would be reduced through the application of Santos's EHSMS Standards and mitigation proposed in Section 3.</p>	<p>Minor short term negative</p>
<p><i>Any reduction in the range of beneficial uses of the environment</i></p> <p>The footprint of activities for the proposal would not result in any reduction in the range of beneficial use of the environment.</p>	<p>Nil</p>
<p><i>Any pollution of the environment</i></p> <p>There is minor potential for short term negative impacts during activities. However mitigation documented in Section 3 would minimise the potential for impacts.</p> <p>CSG is seen as a transitional fuel in the aim for a carbon neutral energy source. The potential to secure CSG reserves has long term positives.</p>	<p>Short term negatives Long term positives</p>
<p><i>Any environmental problems associated with the disposal of waste</i></p> <p>Drill cuttings would be essentially inert and any drilling fluid conditions would be biodegradable or similarly inert and would be allowed to dry onsite and disposed of in drilling sumps. Any other waste generated by the activities will be collect and removed from site for disposal at approved landfill sites. Given the short term of the propose activity waste production will be minimal.</p> <p>Water produced will be temporarily stored in tanks and transported to an appropriate licensed facility.</p>	<p>Nil</p>
<p><i>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply</i></p> <p>Resources required for the proposal are not in limited supply in the area.</p>	<p>Nil</p>

## 5. Pump Test Management Plans

### 1. Landholder Management Plan

The proposed site for the Longlea pump test lies on free hold land owned by Altomonte Holdings Pty Ltd. Santos will negotiate with Altomonte Holdings Pty Ltd and enter into an Access and Compensation Agreement. The site lies adjacent to Barker's Road, a public road maintained by the Gunnedah Shire Council. Santos will access the site in accordance with the REF approved on 29 June 2005.

### 2. Water Management Plan

The site is on flat open land with good access via a gravel road (~ 100m away) which is maintained by the Gunnedah Shire. The site will be constructed so as to minimise potential for produced water to flow from the site. All meteoric water will be directed around the site so that water from adjacent areas does not flow onto the location or from the location onto the adjacent areas.

Water will be recovered via an installed downhole PCP (Progressive Cavity Pump). This type of pump requires low maintenance and pump rates can be accurately monitored and controlled. The pump will be installed as per Appendix C.

The produced water will be stored in relocatable above ground tank(s).

The quality of the produced water is expected to be benign. Available water data was collected during a short air-assisted test of Longlea 1, drilling programme in (April 2006). The test produced a water flow of approximately 40 l/min with a salinity of approximately 2600 ppm TDS. The results are listed in Table 1 below.

**Table 1.**

Sample time		5:35pm	5:45pm	5:55pm	6:00pm	6:05pm
Flow	L/min	48	42	39	42	42
pH		9.54	9.6	9.4	9.5	9.5
Conductivity	mS/cm	5.3	5.35	5.32	5.23	5.23
Total salinity	ppm	2,650	2,670	2,660	2,600	2,600

During the pump test pressures and water volumes will be monitored through a flow meter (as per the lease layout in Appendix F) with the data stored in a data logger. The data will download on a regular basis and reported in accordance with the regulatory approvals.

Produced water will be removed from the site via road transport and trucked to a licensed facility.

### 3. Greenhouse Gas Management Plan

Climate change is a long-term issue and Santos as a stakeholder in the energy business recognises that one of its key social and environmental responsibilities is to pursue strategies that address the issue of climate change.

Santos is committed to working with government, community and other industry to address climate change with specific focus on addressing energy efficiency, adaptation strategies, development of good policy, the transition to lower emission technologies and reporting transparency.

A key aspect of addressing climate change is this greenhouse gas emissions management strategy. The greenhouse gas emissions management strategy has three key components:

- design and construction of assets (development);
- energy efficiency (operations); and
- the measurement and reporting of greenhouse gas emissions.

Santos believes that the pump test will remain gas neutral for the duration of the pump test. It is not anticipated that gas production will occur during this pump test. All fluid will run through a small separator and any gas, if present will be diverted to a flare line at which point the production operator will shut the well in and cease the test. The DPI will be notified of any evidence of gas production.

#### **4. Test Operation Management Plan**

A Santos representative will be available for the duration of the pump test.

#### **5. Safety Management Plan**

Please refer to the Safety Management Plan attached



Appendix A – Figures

Figure 1

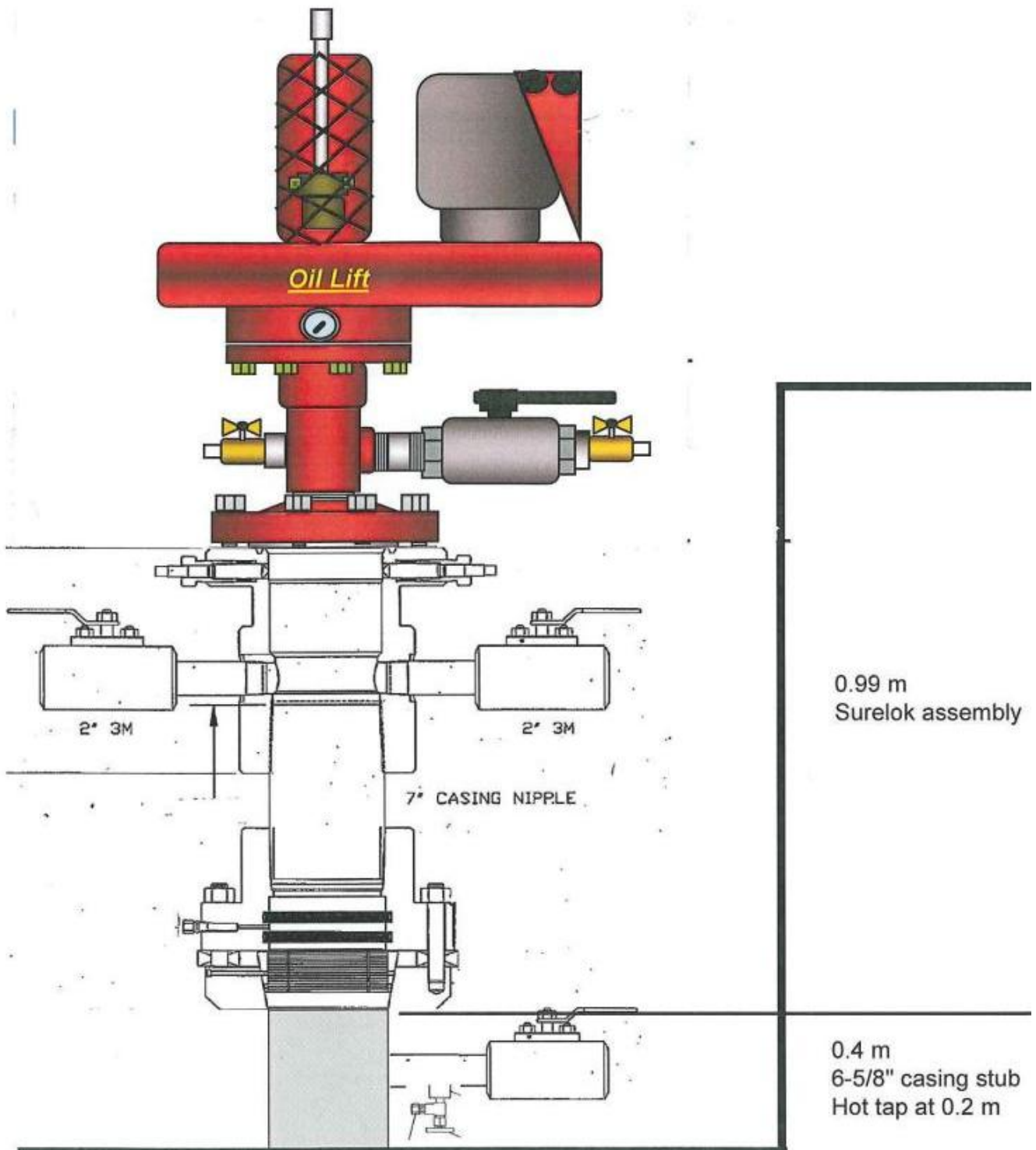


Figure 2

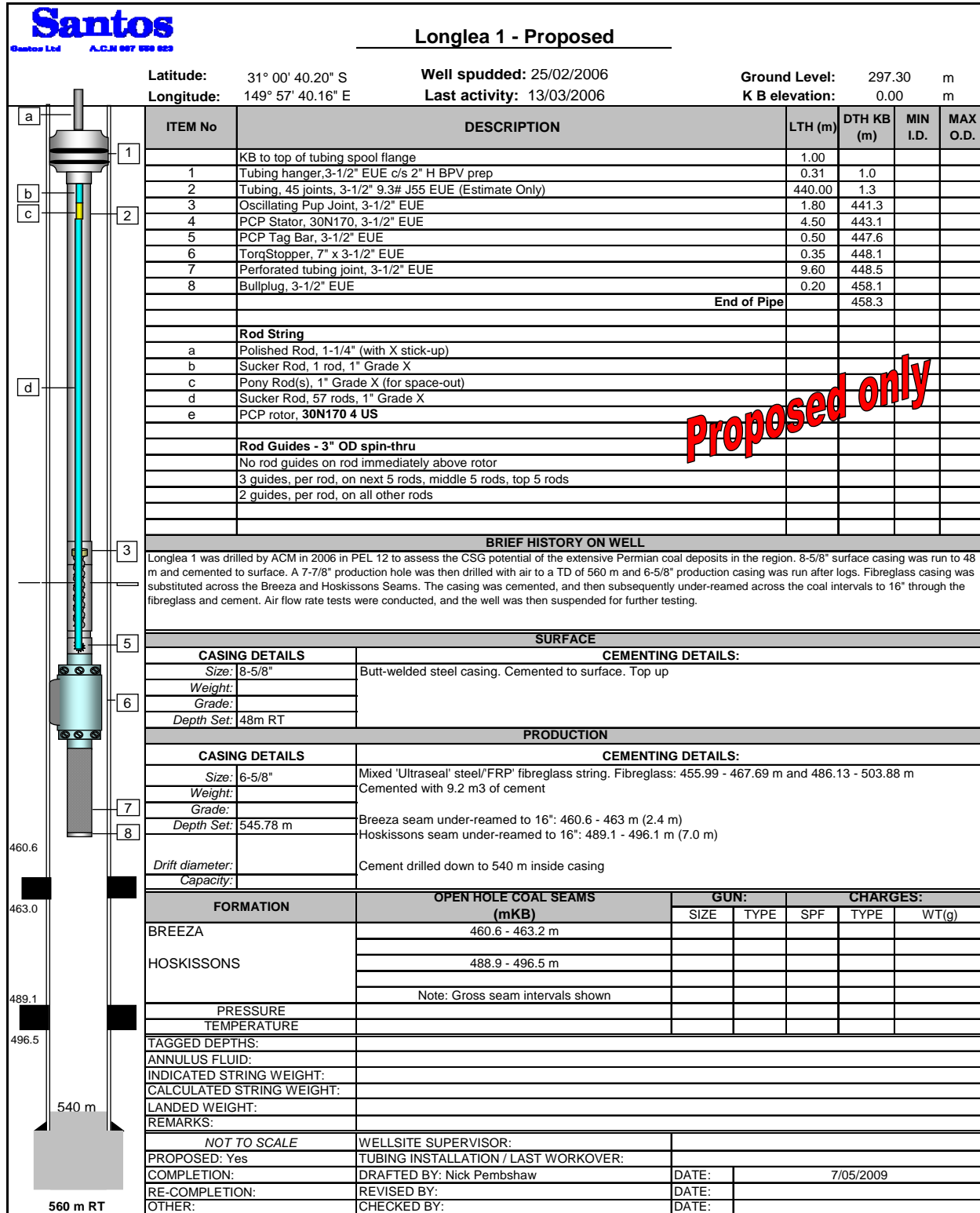
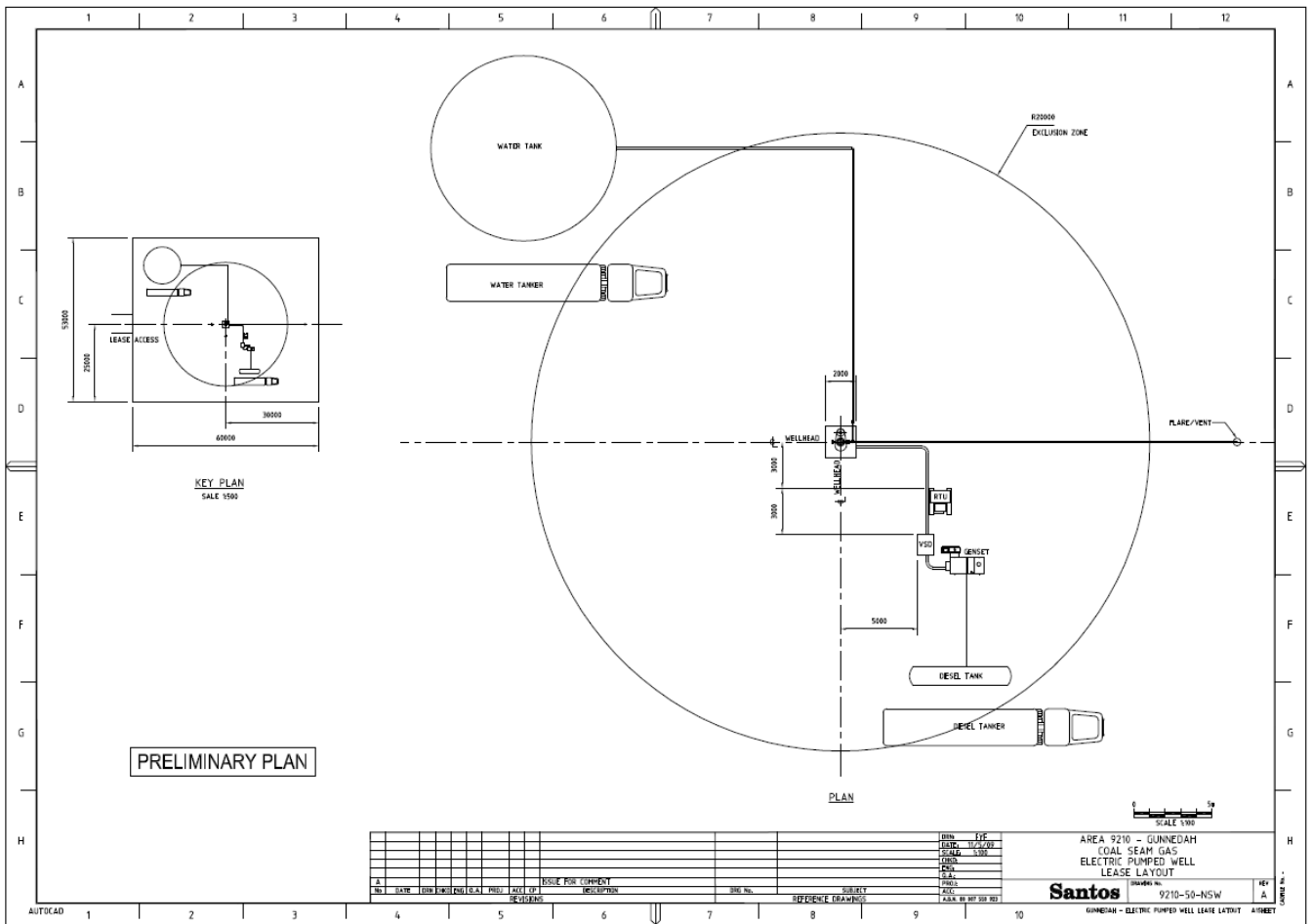


Figure 3



**Appendix 1 - Longlea 1 Production Test.**

**Coal Seam Gas (CSG) Coring Operations  
Safety Management Plan Revision 4 (11 May 2009).**

**Revision Number: 2.01**

This Appendix to the Santos Coal Seam Gas (CSG) Coring Operations Safety Management Plan Revision 4 (11 May 2009) sets out the requirements to safely complete the Longlea 1 Production Test. This document is to be read in conjunction with the above referenced Safety Management Plan.

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## Purpose and Scope

The purpose of this document is to detail the activities in the Longlea 1 Production Test and identify the associated responsibilities for health and safety.

This document is an Appendix to the Santos Coal Seam Gas (CSG) Coring Operations Safety Management Plan (Revision 4), and applies to all activities being conducted on Longlea 1 and all Santos QNT personnel and contractors engaged in this work.

### 1 Referenced Documents

Santos QNT has a comprehensive Environmental Health and Safety Management System and arrangements for assuring compliance with New South Wales Petroleum and Safety legislation. This information is detailed in documents submitted to Department of Primary Industries including the;

- Santos Coal Seam Gas (CSG) Coring Operations Safety Management Plan Revision 4 (11 May 2009); and
- Wellsite Emergency Response Plan for CSG Exploration Coreholes, Gunnedah Basin, New South Wales - Revision 4 (11 May 2009).

### 2 Environment, Health and Safety Responsibilities

All persons working at or visiting the project site shall comply with relevant requirements of the Santos Environment Health and Safety (EHS) Management System, the referenced documents, or the requirements of the Contractors' own Environment, Health and Safety Management Plans where they are more stringent than the Santos standards.

The Table below details those with the principal EHS responsibilities for the Longlea 1 project:

<b>Name</b>	<b>Position held</b>	<b>EHS responsibilities</b>	<b>Contact number</b>
Tom Lonergan	Technical Co-ordinator CSG Growth	Project Leader - Responsible for project funding and interpretation of final test results.	(07) 38383572
Kelvin Wuttke	Team Leader CSG Completions	Overall responsibility for managing onsite safety performance. Responsible for planning, coordination, scheduling and compliance for the project.	0408 199 879
Jonathon Koch	Completions Responsible Officer	Daily contractor management and monitoring responsibility for the project.	0409 831 580
Operators Representative	Santos QNT Site Representative	Responsible for site based auditing to ensure contractors adhere to their safe operating procedures, operate consistent with Santos QNT EHS expectations and apply a consistently high standard of EHS supervision.	TBA
Martyn Woodhouse	AGR	Responsible for the EHS performance of that contractor's operations.	0409614623
David Nommensen	Viking Energy	Responsible for the EHS performance of that contractor's operations.	0419 753 528
Doug Watson	Eastern Well Group	Responsible for the EHS performance of that contractor's operations.	0427591558
Company Representative	Weatherford Wireline	Responsible for the EHS performance of that contractor's operations.	(07)34829900
Company Representative	Wood Group	Responsible for the EHS performance of that contractor's operations.	(07)38897782

**Table 1 – EHS responsibilities for Longlea #1 Production Test Project**

### 3 Activities and Management of EHS Risks

The specific hazards of this project will be detailed by the Significant Hazard Risk Registers (SHRR) developed for this site, as required in Santos EHSMS 09. These SHRR's will be developed as the detail design is completed for each stage of the project.

At all times Santos QNT remain responsible for safety at the site.

Risk controls that are applicable for all stages of the project include:

- Compliance with Santos EHSMS and Santos policies.
- Use of industry standard safety tools, for example Job Hazard Analysis, Step-back & Wellsite Permit to Work.
- Equipment being used within design basis and with skilled workforce.
- Contractor's Standard Operating Procedures.
- Significant Hazard Risk Register for each site/activity, including controls.
- Induction of site personnel to establish an understanding of the site conditions and safety expectations of Santos QNT.
- To control exposure to any potential gas source on the Longlea site during this project, pressure barriers / isolation and gas monitoring will be maintained during site activities, combined with well shut in procedures in event of gas being detected.

#### 3.1 Stage 1 – Prepare Longlea #1 for Production Test

##### **Project stage will be managed by Santos QNT (CSG Drilling and Completions).**

Prior to the project commencing an Icebreaker will be conducted for all parties involved in project to induct them into the project and establish an understanding of Santos QNT EHS expectations.

- To enable access to the existing casing and provide a safe work area a local earthmoving contractor will prepare the site including grading of the lease and if necessary installing a cellar.
- Hot tap into existing casing stub to install a valve to bleed-off any pressure, if present, and also pump water into the casing to maintain a fluid barrier. This work will be completed prior to rig mobilisation by the hot tap crew from Eastern Well Group.
- Following bleed down of pressure in the casing, remove the cap from the top of the casing using a cold cut method. This work will be performed by the hot tap crew from Eastern Well Group.
- A specialist pressure control contractor, Wood Group, will install a wellhead for pressure control, and to enable mounting of the pump drivehead.
- A specialist well logging contractor, Weatherford Wireline, will run a drift, and a cement bond log to confirm well integrity before subsequent stages of the project are undertaken.



### 3.2 Stage 2 – Installation of surface facilities, Installation of Downhole pump and commissioning of facility.

**Downhole pump installation will be managed by Santos QNT (CSG Drilling and Completions). Surface facility installation and site commissioning will be managed by AGR, with Santos QNT audit review.**

- AGR will fabricate and install:
  - The generator-set and Variable Speed Drive (VSD) to power the pump,
  - The water line and tank. The 300kl tank will be fabricated on site.
  - Truck loading facility, and
  - Gas line vent system.
- After completion of the surface facilities, a specialist workover rig from Eastern Well Group will install tubulars and a downhole pump, and install the drive head at surface.
- The commissioning team will connect surface facilities to wellhead and commission the facilities.

### 3.3 Stages 3 & 4 – Production Test and Water Management.

**Project stage will be managed and supervised by AGR**

The production test will be conducted on a continuing 24-hour, 7-day basis until complete. There are no hydrocarbons anticipated at surface during the test. If hydrocarbons are detected at surface these will be flared using the auto-ignition vertical flare stack.

Visits to the site will be conducted by AGR personnel twice daily. Upon detection of any hydrocarbon flaring, the well will be shut in.

During start-up of the production test, the facility will be staffed full time by AGR during the day, to confirm the facility is operating within design criteria, with subsequent daily visits until the conclusion of the test.

The test data (including pressures, flow rates and temperatures) will be recorded locally and with remote monitoring capability. Data will be sent to Santos QNT Brisbane office for interpretation.

Produced formation water will be contained in the 300kl tank onsite and regularly removed via water tankers from the storage tank to local council disposal area.

The 300kl storage tank has an estimated 4 ½ days capacity at predicted flow rates, is monitored daily with site visits from AGR personnel and tank overflow protection will include a high level alarm with automatic pump shut down.

Santos QNT will also have an Operator's Representative on site for the start-up of this stage of the project. For the remainder of the production test a Santos QNT representative will conduct regular visits to site to audit the AGR operations, site conditions and equipment.

### 3.4 Stage 5 – Deactivation of the site

#### **Project stage will be managed and supervised by AGR**

The surface facilities will be decommissioned and all surface equipment including drive head will be removed. The Longlea #1 well will be suspended and the lease cleaned up.

## 4 EHS Risk Management

Santos QNT and contractor procedures or work instructions will be used to manage the activity. Periodic onsite assessment by Santos QNT of contractor adherence to risk controls will be scheduled to demonstrate the risk controls detailed in the site specific SHRR's are in place on site and are effective in controlling the risk, and risks are controlled to a level that is ALARP.

### 4.1 Coordination and scheduling of work

Santos QNT will be responsible for coordinating work throughout the project, but will directly manage operations during stage 1 and the pump installation during stage 2.

AGR will manage facility construction and commissioning during stage 2.

AGR will manage site activity during stages 3-4.

Santos will manage activity during stage 5.

## 5 Santos QNT Emergency Contacts

The table below sets out the key Santos QNT contact personnel for an emergency.

Title	Name	Phone Number
Manager – CSG Drilling & Completions	Darren Greer	Mob: 0402 034 750 Office: (07) 3838 3968
Team Leader – CSG Completions	Kelvin Wuttke	Mob: 0408 199 879
Santos Responsible Officer	Jonathon Koch	Mob: 0409 831 580
EHS Advisor	Craig Easton Reece Purser	Mob: 0409 769 000 Mob: 0427 727 467
Corporate Safety Advisor – Drilling & Completions	John Easton	Mob: 0439 804 726 Office: (08) 8116 7840
Gunnedah Basin Project Manager	Stephen Kelemen	Mob: 0413 015 468 Office: (07) 3838 3635
Gunnedah Basin Project Operations Manager	Carl D'Silva	Mob: 0401 684 230 Office: (02) 9887 1366

**Table 6 – Santos QNT emergency contacts..**