

MEETING MINUTES

9 April, 2014

Minutes: Santos Community Committee - Narrabri Shire
Wednesday, 9 April 2014
Narrabri Golf Club, Narrabri

Attendance: David Ross (Chair), Tahnee Laycock (Secretary), Ann Stewart (Santos), Vesna Rendulic (Santos), Sigrid Sanderson (Santos), Brendan Warnock, John Tough, Ian Duffy, Ken Flower, Ron Campey, Victoria Hamilton, Pallavi Mandke (GHD).

Apologies: Jon Maree Baker, Annie Moody (Santos), Tony Pickard, Terry Hynch, Michael Guest.

	Discussion	Action/By Whom
<p>1. Welcome, apologies and introductions</p>	<p>The chair opened the meeting at 5:39pm. Chair welcomed committee. Introduced GHD Representative: Pallavi Mandke. Introduced Santos Sigrid Sanderson and Ann Stewart who is filling in for Annie Moody while she is away.</p>	
<p>2. Social Impact Assessment</p>	<p>Sigrid Sanderson introduced herself as part of the environment and water team for Santos. Sigrid is heavily involved with the impact statement that Santos is currently preparing for the Narrabri Gas Project. The bulk of today's meeting is to get the CCC's input and thoughts on the social impacts and benefits of the Narrabri Gas Project.</p> <p>The Preliminary Environment Assessment (PEA) was submitted on March 31st and is up on the Santos website and Department of Planning website. This is the very first step into starting the environmental assessment. The PEA defines the scope of what the EIS needs to address.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p><u>EIS process:</u></p> <ol style="list-style-type: none"> 1. Preliminary Environmental Assessment 2. Director General Requirements – 28 days to respond 3. Prepare and lodge EIS 4. Public Exhibition – minimum 28 days 5. Community and stakeholder submissions 6. Agency and proponent response to submissions – timeframe depends on amount of submissions 7. Draft conditions 8. Government Assessment Report 9. Planning Assessment Commission review 10. Public hearing – will be conducted in the latter half of 2014. 11. Planning Assessment Commission report 12. Planning Assessment Commission determination <p><u>Typical technical reports that underpin an EIS include:</u> Groundwater, Biodiversity, Cultural Heritage, Non aboriginal heritage, Social Impact, Agricultural Impact, Noise and vibration, Air quality, Surface Water, Traffic and transport, Visual impact Hazards and risks, Economics, Cumulative Impacts and others as appropriate.</p> <p>All the studies and assessments will be completed simultaneously. Technical studies are completed and the research is gathered. What you usually find is components of one study often crossover into other studies for example ground water feeds into agriculture impacts.</p> <p>Q. Committee member: Does Santos carry out these studies or commission them to be done by Santos employees? A. Santos: No, Santos does not do these studies. GHD is the lead, independent consultant that carries out this work.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Q. Committee member: In regards to the Agricultural impact, who is performing this assessment? A. Santos: GHD is preparing the Agricultural Impact Statement.</p> <p>Q. Committee member: Are they acquiring specialist farmers to add to Agricultural Impact Statement? A. Santos: There are specific guidelines the Department of Planning has set out that an Agricultural Impact Statement needs to cover and consider. That's what being prepared at the moment.</p> <p><u>Social Impact Statement: GHD</u> Purpose of the SIA – to assess the potential social impacts (positive and negative) of a proposed development.</p> <p>The SIA focuses on:</p> <ul style="list-style-type: none"> • establishing a social baseline of the community • identifying and assessing potential social benefits and impacts on the community through stakeholder and community consultations and desktop research • developing management strategies to maximise social benefits and avoid or minimise social impacts. <p>To this effect the SIA technical study explores a range of topics associated with community wellbeing and quality of life indicators such as cultural, demography, community infrastructure/services and economic aspects of the community.</p> <p>GHD has commenced work on the Social Impact Assessment and we are undertaking a large amount of desktop research trying to understand the scenario in the community as well as trying to understand the impact of resource companies and the impact it can have on this region.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>The SIA will draw upon consultations undertaken with the following stakeholder groups:</p> <ul style="list-style-type: none"> • Local government • State agencies • Health service providers • Emergency service providers • Regional training providers • Housing and real estate service providers • Industry groups – including tourism and agriculture • Regional economic development • Employment and training agencies • Community Consultative Committee (CCC) • Other community and landholder representatives <p>Topic areas for discussion:</p> <ul style="list-style-type: none"> • Community values, aspiration and lifestyle • Economic development • Workforce • Community infrastructure • Housing and accommodation • Landholders • Health • Others <p>Q. Committee member: When you ask the locals what the impact is, what are you going to put up as your business?</p> <p>A. Santos: 825 wells. 425 well sets. Estimating 1200 potential jobs during construction and 200 jobs during operation.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: I think you're 5 years too late. You're doing an impact assessment now, when it should have been done 5 years ago. There has been a huge impact on the town already.</p> <p>Comment: 200 new jobs. Talk is 39 of those are for Narrabri and 161 of them are from Adelaide, Brisbane, Sydney etc.</p> <p>Comment: That's not the way I see it. Santos has been in an exploration phase for some time. This is an environmental impact assessment which is required before it goes into a production phase.</p> <p>Comment: It's hard for us to imagine the impact for just the next 825 wells, that realistically the future is much larger than 825. Once the industry becomes established here the odds are it will be continuing to expand.</p> <p>-The EIS that we are running is just about the 825 wells. If at any point, us or anyone else comes in and wants to do something different there will be another EIS that will need to be completed. It is Santos coming out now saying it will be a 20-25 year project.</p> <p>Community Values – aspirations and lifestyle</p> <ul style="list-style-type: none"> • Existing lifestyle • Existing ethnic and cultural diversity and community cohesion • Community identity/icons • Future of the community • Existing issues influencing community values, lifestyle and aspirations • Current development opportunities and challenges in the community 	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<ul style="list-style-type: none"> • Others <p>Comment:</p> <ul style="list-style-type: none"> -The community now is dealing with a mixture of Santos being here and the coal miners. Everyone has come at once and everything is changed. -Caravan parks went from a couple of hundred dollars a week rent to \$500. -House prices have increased to up to \$1200/week for 4 bedroom 2 bathroom homes. -I love the serenity about Narrabri. -Narrabri is only 5, 6, 7, 8 hrs away from anywhere you want to go to. -We have the mountains that snow during winter, hundred degree days down here in summer. -We have rain, we don't have rain. We have open flats where if you go 50miles you can't see any mountains. -There's always something for people to do. -A lot of workers in the mines, coal and gas, are on good money but if they lose their job it's hard for them to repay things they bought with the new heavy income i.e. new car, house etc. -Others are renting their house out and living with friends and sitting at home living on that investment. <p>Comment:</p> <p>GDP through agriculture is a major part of our lifestyle. The great improvements in recent years in Narrabri are we see ourselves as a very learned place. We have the Sydney University Wheat Research, Telescopes, CSIRO Cotton Research. We like the high level opportunities, not just driving tractors. It is a quality agricultural industry with long term sustainability. Quality jobs mean families can stay together. I like it when wages of quality jobs goes up and people get paid more money. Supply and demand is a nicer way to do it than strikes and unions.</p> <p>Comment:</p> <p>It doesn't play on from the highly educated to come back and take high paying jobs. For example farm</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>manager jobs are hard to fill as workers are being lost to the mines. So farmers are offering high salary positions because they simply cannot fill them.</p> <p>Comment: The treasured historical industry is seen as a lifestyle in farming. That is what they want to preserve. The want to look about their business and see that beauty and retain that beauty every day. Imagine looking out to a flaring gas field. That is what we are being asked to accept.</p> <p>Comment: It will always being agriculture here. However, they do not employ the amount of people they used to. Technology and everything has taken over. To survive and grow this town needs employment for all people. We lose too many of our young people to Sydney, University etc. To get them back we need decent well paid jobs for them. We have droughts here and nothing gets spent in the town. If people didn't have other industries to go to we would be stuffed. We need other industries for gainful employment.</p> <p>Comment: I disagree. We have had droughts here every 4 or 5 years from the time Narrabri was first settled. We have had an ever increasing very slow population increase. Staple town, with excellent sporting facilities. A major boom in our town will have a major detrimental effect on the whole town. If this Santos project gets up and away, we will have 50 jobs here. Big deal.</p> <p>Comment: No one wants to be the collateral damage of this industry. Whether it's from groundwater impacts or surface water impacts etc.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: I would like to include amenities, rubbish and road congestion issues. I would like to look at crime levels particularly sexual and also petty crimes. Also, there is no mention of community and individual wellbeing. There are wellness indexes that could be used to identify general community wellbeing now and in the future due to social changes. There is a level of crime that people wouldn't be happy with at the moment in Narrabri.</p> <p>Comment: Overall, if I walk down the street at any time of the day, I don't feel unsafe at all.</p> <p>Comment: Narrabri doesn't have the crime image that other neighbouring communities have.</p> <p>Comments: We try to get as much value add here as we can in every industry. To that a lot of beef goes out and gets butchered either in Tamworth or Dubbo. Sheep and cattle. The cotton industry has outlaid extensive money to try and get value added. They have gone right through to ginning but haven't been able to go past ginning at this stage. We want to encourage any industry that comes here to get the most value-add out of it, here. Certainly if there are any opportunities for gas or other industries here, we would like to explore that.</p> <p>Economic Development</p> <ul style="list-style-type: none"> • Existing industries – agriculture, tourism, resource development, etc. • Co-existence of various industries in the region – sourcing workforce, etc. • Local business development opportunities • Employment and income generation opportunities • Others 	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: Cattle, sheep and wheat seemed to work together and then the cotton came in and there was huge talk about the chemicals, fences gone down, and the layout of the land. This was huge change but seems to all work pretty well now.</p> <p>Comment: Over the years cattle, sheep and cropping have all worked pretty well. We did have major conflict with cotton industry, marches in the street and people wanting to run them out of town when they came. The shining light that was done well by the cotton industry is they set up an independent research facility and one by one the challenges that they had with fish kills and with methods of aerial spraying were overcome. I believe that because they put money into a cooperative research centre and they had scientist here, it was the scientists here as why we have a cotton industry today and why it wasn't run out of town. The scientists were funded a third by the cotton industry, a third by the federal government and a third by the state government.</p> <p>Comment: When the Americans and cotton industry came here, it was world's best practice. The world's best practice today becomes the world's worst of yesterday.</p> <p>Comment: We are talking about the cotton industry that was here 40 years ago, in 40 years' time where is Santos going to be. Are they going to be still here or down another basin somewhere else? Santos will come in and take the gas as quick as they can and the wells will be decommissioned and they will move on to another area. It's not a perpetuity industry like agriculture is and plans to be. The gas and coal is come and go.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: There is a daily amount of people that comes through but not investing a lot of money.</p> <p>Comment: Tourism could be a big industry here. As the Hunter Valley is completely ruined, who would ever go to Singleton and Muswellbrook for a holiday. As the whole completed industrialised mining of NSW, they will want country areas that are pure. As it turns out now, the mining industry is going to take over the whole of NSW from here to Emerald in Queensland, along the Great Dividing Range. Coal seam gas will think that it's going to spread out all over NSW, every pool they've got and every bit of gas they can get. Tourist will come, they don't want to go to Sydney at look at the Queen Victoria Building, and they do want to come out to a farm and look at it, look at kangaroos jumping around, cattle freely grazing in green paddocks. That is what a lot people want to see exist. This shire could be a marvellous tourist attraction.</p> <p>Comment: There are a lot of eco tours coming out to Coonabarabran National Park every weekend. They run buses into the forest. It can see up to 200 tourists a weekend. If Narrabri get 10 or 20 people it's a big day. There was talk to get it fired up in Narrabri but nothing has been organised.</p> <p>Comment: It comes back to the inability of the Narrabri Shire Council (NSC) to promote Narrabri properly.</p> <p>Comment: If you look at the numbers, in comparison to agricultural, tourism polls into insignificance for what it is now and what its possible potential is. The numbers for tourism are quite light.</p> <p>Comment:</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>It all helps and integrates the town.</p> <p>Q. Committee member: How much does the NSC spend on tourism campaigns? A. Committee member: Out of 11million in rates, NSC spends 7 million on tourism, which is a big commitment.</p> <p>Comment: With the social impact we really want to see the cost benefit. If there is a benefit to jobs. In the end we want to optimise the benefits and minimise the costs.</p> <p>Comment: If it was bottled gas it would be all right, but it is pipeline gas and there isn't much flowing unless you have factories and warehouses. Bottled gas you can use it anywhere.</p> <p>Comment: When I was on the CCC for Eastern Star Gas, we did talk about putting in a proper compressor station so the local cotton farmer could potentially run a lot of their farm machinery on delivered gas from tankers. You get huge environmental benefits and alot less pollutants. If the gas was at the right price everybody would benefit. We would have another industry employing 30 or 40 people.</p> <p>Comment: Another question is, will it be cheaper here? If the gas is no cheaper here than it is in Sydney, it's going to be very hard to get industry's here. If gas supply runs out in Sydney, I am told that there are a lot of businesses that their only way of doing manufacture is through gas. So if it's cheaper here than in Sydney, there a chance that that's an opportunity to incentivise. That will have a big bearing on how much economic impact we can get here.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: We won't get the workforce. You can't even get a mechanic in town these days.</p> <p>Comment: If you could get a gas pipeline in here, that would be an incentive to bring other industry's here. It would be cheaper for them to set up here than in Sydney. Everything is up in the air as there is no guarantee that we will get gas here. Eastern Star spoke about a 10-15% discount on the gas. Santos would need to make up their mind if they were willing to gamble on that.</p> <p>Comment: I have been doing some research and spoke with 217 places. A build up is going to happen and then a slump is going to happen. No one is sure. We have the MAC village building up; they charge \$200 a night. Out of 500 rooms 46 are set aside for staff. Not all staff is from Narrabri.</p> <p>Comment: You can go to similar towns such as Muswellbrook where you have your town that stays the same, only it is surrounded by mines.</p> <p>Workforce</p> <ul style="list-style-type: none"> • Existing local employment and unemployment situation • Skills availability in the region • Presence of FIFO/DIDO workforce in community • Demand on existing local workforce • Others 	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: I think the overlay is that if there is 200 jobs long term, which has got to be local jobs. Not fly in fly out.</p> <p>Comment: 39 local jobs. Santos's blog is 200 ongoing jobs, 160 from Adelaide, Sydney, Brisbane and the balance of 39 for Narrabri.</p> <p>A. Santos: No that sounds like what is happening now, that there are 39-ish jobs in Narrabri now and there are jobs in Sydney and Brisbane. During operation there will be 200 jobs in Narrabri. There is a workforce of 1200 in construction and then those jobs disappear and there is a much smaller workforce to continue operating as it goes on for the next 20-25 years.</p> <p>Comment: Santos needs to train people. The Shire met with key officials in Santos in the early days when they were doing the investigation to discuss where the control centre goes is a key point. They did mention it is possible it could go in Brisbane or Sydney and the Shire put across a very strong case that if Santos wanted to go ahead with this we wanted a commitment that the control centre would be here and the jobs are here. That commitment was given.</p> <p>Comment: Skill shortages are a problem and have been for quite some time. University students tend to come back but Tafe training people tend to get caught elsewhere. There is a push to try and retain people here for all industries. We want to establish technical and mechanical TAFE training up to Cert 4.</p> <p>Comment: There has been competing demands. With competing demands the price tends to go up. With time it evens out and whilst there are disadvantages to that, there are ups and downs in the industry that we deal with, cotton industry prices go up and down, the amount of water we have to make cotton goes up and</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>down, grain prices go up and down. So it's good to have a mix. The key thing is, there's conflict but having the mix of different employers is very handy. During the millennium drought the wages came in quite handy from the mines and off farm incomes are very important.</p> <p>Comment: You're either a farmer or a farmer with off farm income. They don't just decide there is a drought coming along; we'd better get a job in the mines.</p> <p>Comment: Average farm incomes are below \$100,000 income. We do have a lot farmers who like living on the land are hobby farmers.</p> <p>Comment: If your main form of income is primary production, you are a farmer in the case of the law and tax system.</p> <p>Comment: There is an overall impact of the town already from coal seam gas and coal mining. You can't talk about one without the other. There basically are no agricultural dealers in town. You have a business that sells spare parts, John Deere, they don't have any mechanics. The CLAAS Harvest Centre has just been bought out and you see in 3-4 months if they are still there. There are two workshops businesses in town: Repco – which has about 4 or 5 people working for them. Narrabri Clutch and Brake – 3 or 4 people workers. He is due to retire soon and that business will fall over. There is nobody being trained and all the young apprentices have done their trade and moved on. Majority have gone to the mines because if you're a qualified fitter, which used to be called a mechanic, you can get \$120,000/yr. Local business can't pay that sort of salary. The mines and the gas industry don't have problem finding people but there is a huge gap for the rest of the community afterwards.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: All trades, not just the mines.</p> <p>Comment: Narrabri has always been dearer but now it is really expensive. It has always been for example: in Tamworth you could rent a house for \$220/week, in Narrabri it would be \$300/week.</p> <p>Comment: Positive social benefit of having high paying jobs here is that your children can stay here with you to earn money.</p> <p>Comment: One side of FIFO workers is that they don't spend money in the town but on the other hand they keep the rental market down. The MAC village has freed up other local accommodation and brought rental market down.</p> <p>Comment: The MAC village is also not contributing to the local economy as seen through their assurance they wouldn't set up a gym and then they did which affects the local gym now.</p> <p>Comment: The RSL is pretty disappointed as there aren't as many people coming in from the MAC village. They built a path from the RSL to the MAC village but it is hardly being used.</p> <p>Comment: The good thing is, the mines keep a very strong drug and alcohol regime and that's why they don't come</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>into town drinking. Because once they start they can't stop. The social issues we're getting from this behaviour needs to be weighed up over the money they are spending in town. We had social issues at the MAC village and on the way into the RSL and at the airport and those issues have been addressed by the mines and the local council.</p> <p>Comment: In Boggabri the STD's rate in 15 year olds has gone up massively. Statistics are from the Department of Health.</p> <p>Comment: Someone did a survey of the main street to see if they had increased business because of the mining industry being here. Three said yes and the rest said no.</p> <p>Community Infrastructure</p> <ul style="list-style-type: none"> • Existing capacity/adequacy to social infrastructure – health/medical services, community services, child care, emergency services, and others and what are the future needs • Demand on social infrastructure facilities and services from non-resident workforce • Priority areas of development/improvement in social infrastructure • Existing community development initiatives/projects • Others <p>Comment: We have a local doctor that is retiring in the middle of June. He has an operating doctor coming to replace him and his wife is a general practitioner as well. Boggabri has gained a couple.</p> <p>Comment: In Wee Waa there is a doctor that fly's out every Thursday morning and fly's back in every Monday</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>morning. There is nobody in Wee Waa that has got any triage one coverage except for the nursing staff that is there.</p> <p>Community: Childcare was flagged as a problem because there were more two income families. But we did get a government grant and we have got some money from a voluntary payment agreement from the mines. So it is flagged as a problem and there is money being put to address it.</p> <p>Comment: With the majority of the staff being young fit and healthy. We don't see much impact on our hospital system in Narrabri. If we ever have a disaster, we could be in trouble. At this stage they are all young people, mainly men, fairly fit, FIFO – goes home, get sick, and stay home for a week.</p> <p>Comment: We are low on doctors.</p> <p>Comment: Mental health is huge concern. To get a better idea on this I would speak with the hospital.</p> <p>Comment: The challenge that this shire has seen from resource development is that all the revenues go to state and federal government and a lot of the costs in doing infrastructure, roads, subdivisions etc., has come on the local shire. We have argued long and hard to get reasonable voluntary payment agreements and we worked our way up to get 13.5c/tonne and the latest VPA it looks like they won't even pay this 13.5c/tonne for something where the state government is getting around \$8.70. One of the things is the local infrastructure does get impacted. We believe there should be an income stream for the local people from the royalty. The local community should also get to decide where they want to spend it, whether it is</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>doctors, subdivisions, heated pools, crossing theatre. The challenge that we have currently had with the VPA's being paid is that they say we will pay for half of the money for the heated pool then we have to get the money for the other half and then we have to pay to maintain it forever. They end up getting it for cheap and we end up having the problem. We are not going to go down that road again.</p> <p>A. Santos. In South West QLD Santos have been working and operating these areas for council with a continued obligation for the last 22 years.</p> <p>Landholders</p> <ul style="list-style-type: none"> • Existing situation of farmers/landholders within Narrabri Gas Project area (activities, lifestyle, challenges) • Potential social benefits and impacts as a result of the proposed gas field development <ul style="list-style-type: none"> - Income and employment opportunities - Anticipated changes to day to day activities or lifestyle - Anticipated changes to agricultural activities - Access to and within property - Amenity issues (noise, vibration, dust, visual, loss of privacy) - Co-location of agricultural activities and project • Others <p>Comment: A survey was held and research showed 96% of landholders said yes they want to live in a gas field free area. 2.5 million hectares of land has been declared coal seam gas free in the North West of NSW by landholders. The survey was self-co-ordinated by individual groups. There were three answers you could give: 1. Yes – I want gas field free 2. No – I'm happy to live in a gas field and lastly 3. No opinion.</p> <p>Comment: Most of the people that I have spoken to feel they have everything to lose and nothing to gain from coal</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>seam gas. Particularly on irrigation farms, we have been told that they can co-exist and the pipes and wells can be installed in such a way that has minimal impact. People get told a certain level of development will occur but there is a gradual increase in power lines, water lines, flares, and pipelines etc. The people that have hosted the developments in QLD understood that they were going to receive a certain amount of infrastructure on their land and ended up being a lot more than what they thought.</p> <p>Comment: Landholder impacts need to be taken into account and the extra stress created. Also the time, energy and stress generated for landholders having to police the access agreements for the inevitable breaches as seen around Roma. There is so much distrust of the industry by landholders at what really is going to go on. I think it should be a requirement that the access landholder should be fully informed by the local, state and federal governments of any detriments to them. The massive legal aspect has never been addressed. They don't have any idea on what they are being asked to sign. They don't understand the industry enough to say yes or no.</p> <p>Comment: I believe in the day time, when you're out in the dust working, the dust is probably more important and what you worry/ stress about, however at night when you're at home relaxing your worrying about the legal aspects. You can't really say one's more important than the other.</p> <p>Comment: I was just recently up in Dalby and I talked to a lot of people with infrastructure on their farms. Some of them signed an access agreement to have a pipeline through their farms, that one goes in and then 18 months later they slip another one in alongside it or stick one on top. 18 months later it happens again. Once you give the right to easement, you have given them the right to that land. Whether they want to put something under the ground, above the ground, power lines etc. It's a damn mess.</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
	<p>Comment: The truth is they are going to tell you anything to make you feel comfortable and safe and slowly work on you. There is a lot of pressure on us now. We will be the ones left behind.</p> <p>Comment: The garbage we are finding on the Gunnedah road is terrible. The drivers, on their way to work, don't want to have the rubbish heating up and left in their new car all day so they just chuck it out the window. The coal mine paid for the rubbish collection. It's happening at certain points where they finish the food item or just out the front of the workplace.</p> <p>Health</p> <p>Comment: There is a concern that the statistics of injury aren't being recorded in Queensland. I want to know if this will happen here and given to the government.</p> <p>Comment: As far as health goes, you're either healthy or you're not. If someone has a mental breakdown, do we have somebody in town to fix it? Or the facilities in town to do it? The hospital would be the best place to find out. The biggest thing out there is not having people working on their own.</p> <p>Comment: Are their adequate controls in the industry itself to ensure that its workers are safe?</p> <p>Comment: One of the impacts for me, I actually like the use of gas for energy because of its lower impact on noxious</p>	

MEETING MINUTES

9 April, 2014

	Discussion	Action/By Whom
<p>3. General Business</p> <p>a. Other Business</p>	<p>gases and also because it halves the greenhouse gases. I would much rather see gas burning than benzene and coal.</p> <p>Comment: Methane puts out 20 times more carbon dioxide. I rang the federal government yesterday.</p> <p>Comment: From the time it is discovered to the time it is actually burnt there is thought now that it can up to 50% dirtier than coal. Coal seam gas is 20 times more destructive in CO2 levels than coal. The overall use of coal seam gas and conventional gas is up to 1.5 times worse for the environment for coal.</p> <p>Q. Committee member: With the people living in the surrounding areas of the 825 wells, who is aware of what they are going to be subject to i.e. the negative impacts? A. Santos: This is something that is assessed and is captured in the hazards and and risks assessment. I'm not the right person to answer this question so it's probably better that an expert answers this.</p> <p>Q. Committee member: Has the date closed (with regards to consulting on the SIA) to give you something else. I have somebody giving me something but they haven't quite finished it yet. A. Santos: If you could get it to me in a week that should be fine.</p> <p>Next meeting is May 14, 2014.</p> <p>Topics for next meeting: Leewood Phase 2</p>	

9 April, 2014

MEETING MINUTES

Next Meeting Topics: Leewood Phase 2

Date of next meeting: May 14, 2014

Meeting Closed: 8:06pm

MEETING MINUTES

9 April, 2014

Attachment 1: Actions

Action Raised	Date Raised	Progress Made
Action for Santos to provide committee with full soil analysis including analysis of bacteria of the Leewood site next year when it is available. As well as providing regular soil checks to ensure no contamination is occurring.	11th December	Ongoing
Action for Santos to explore the option of formalising the committee.	18 th June	Ongoing waiting on response from DRE
Santos to provide further details on the erosion management plan for the flow line project	18 th September.	CCC will be provided a copy of this once it is finalized.
Santos to arrange site visit	12 th February	Finalised
Chair to notify committee of details of site visit	12 th February	Finalised
Committee to determine whether to hold discussion in one night or over consecutive nights	12 th February	Finalised
Santos to provide the conversion factor from standard cubic feet to peta joules	12 th April	Finalised
Santos to provide the metric values for scfd	12 th April	Finalised
Santos to find out if the EPA requirements come in at 16mega watts	12 th April	Finalised
Santos to notify if gas to be supplied to Newcastle	12 th April	Finalised
Santos to respond to questions raised regarding recent aquifer contamination and associated questions within 10 days	12 th April	Ongoing
Action for the Chairman to forward VOC response to committee member	12 th April	Finalised
Chair to notify committee of the two possible dates of site visit	12 th April	Finalised

Santos Community Consultative Committee – Narrabri Shire Meeting

Wednesday 9th April – 5:30 pm to 7:30 pm

Narrabri Golf Club

1.	Welcome, apologies and introductions	5:30 – 5:35	All
2.	Previous meeting minutes	5:35 – 5:40	David Ross
3.	Social Impact Assessment	5:40 – 8:40	GHD
4.	General Business <ul style="list-style-type: none">• Next meeting and issue to discuss	8:40 – 8:45	All



Santos NSW (Eastern) Pty Ltd

**Energy NSW Coal Seam Gas Exploration and
Appraisal**

Produced Water Management Plan

PEL238 PAL2 PPL3

10 February 2014

Table of Contents

1. Introduction	3
1.1. Purpose and scope	3
1.2. PWMP summary table	3
1.3. Background	3
1.4. Existing approvals	5
1.5. Implementation of this Plan	7
2. Characterisation of Produced Water	9
2.1. Produced water source	9
2.2. Produced water quantity	9
2.3. Produced water quality	10
3. Produced Water Management	12
3.1. Produced water gathering and transfer	12
3.2. Produced water storage facilities	14
3.3. Overview of infrastructure monitoring	14
4. Options for produced water treatment and reuse	19
4.1. Desalination	19
4.2. Chemical amendment	19
4.3. Amendment using other water sources	20
4.4. Beneficial uses of produced water	20
4.5. Concentrate management	20
5. Record keeping of produced water management	21

1. Introduction

1.1. Purpose and scope

This Produced Water Management Plan (PWMP) has been developed in accordance with the requirements of condition 14 of Petroleum Exploration Licence (PEL) 238. It is designed to provide information about how Santos NSW (Eastern) Pty Ltd (Santos) will manage produced water resulting from the operation of its coal seam gas (CSG) Exploration and Appraisal Program activities in the Narrabri area that includes land within PEL238, Petroleum Assessment Lease (PAL) 2 and Petroleum Production Lease (PPL) 3. It also covers the management of the remaining produced water associated with the previous operation of CSG activities in PAL2 and PEL238.

This PWMP supersedes the previous PWMP dated December 2012 that was approved by the NSW Department of Trade and Investment on 19 March 2013.

In accordance with condition 14 of PEL 238, this PWMP has been prepared in consultation with the NSW Office of Water and the NSW Environment Protection Authority and will be submitted to the NSW Office of Coal Seam Gas (CSG) for approval by the Minister administering the *Petroleum (Onshore) Act 1991*.

1.2. PWMP summary table

Table 1 summarises the content requirements of condition 14 of PEL238 and where this information is provided in this PWMP.

Table 1: Content of Produced Water Management Plan

PWMP requirement under condition 14 of PEL238	Section Reference
Expected sources and estimated quantities of produced water	Section 2
Proposed containment measures	Section 3
Proposed treatment measures	Section 4
Proposed beneficial reuse or disposal methods	Section 4
Controls to be implemented to prevent and/or minimise pollution	Section 3
Record keeping for the quality, quantity, transport and disposal of produced water	Section 5
Staging process for implementation of the PWMP	Section 1.5

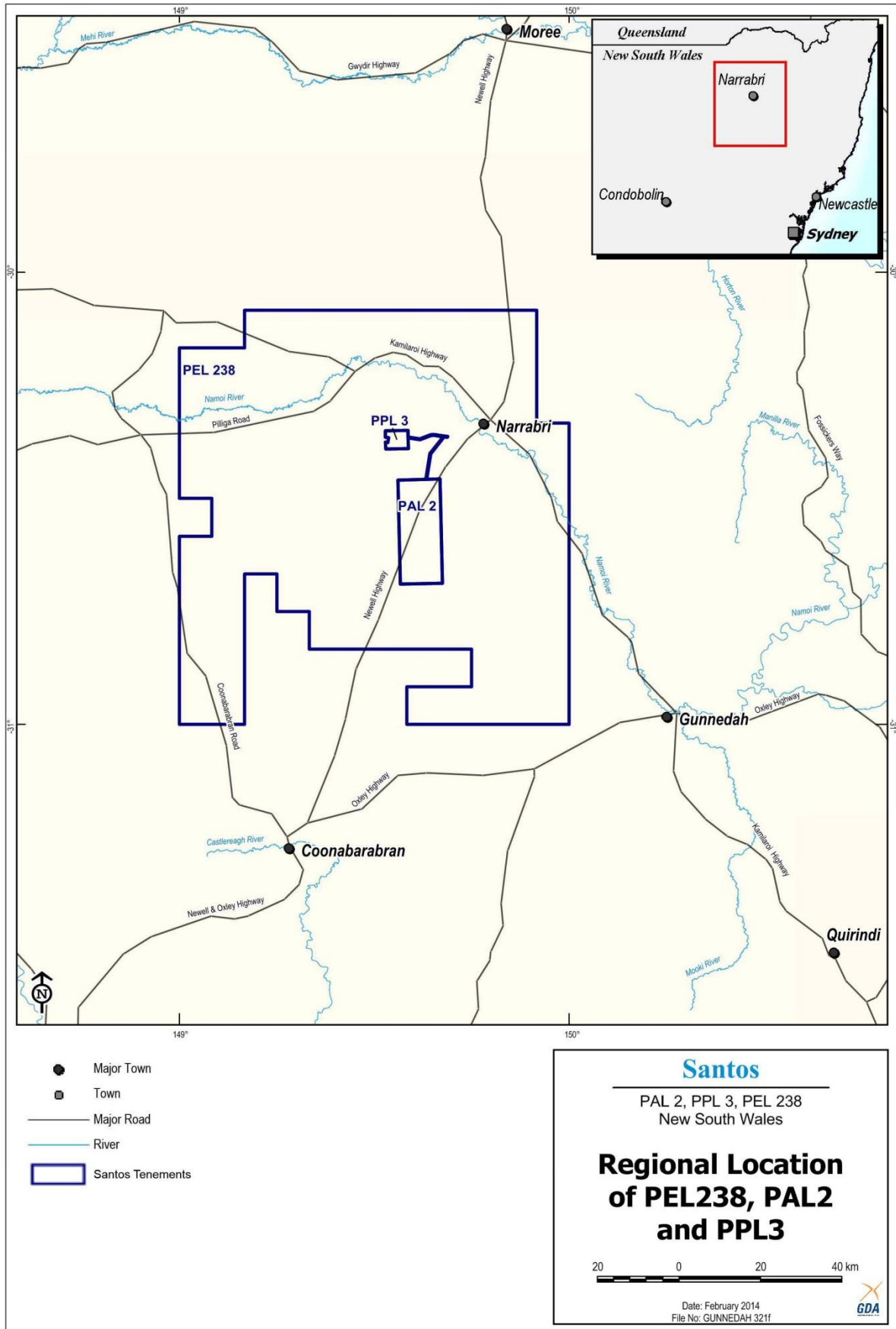
1.3. Background

Santos is an Australian energy company that has been supplying natural gas to New South Wales from South Australia for almost 40 years. Santos has been safely and sustainably extracting coal seam gas in Queensland for more than 20 years. Santos' operations in NSW are focussed on the development of natural gas from coal seams in the Narrabri area in north-west NSW.

Santos began exploring for coal seam gas in NSW in 2008, completing seismic surveys and drilling core holes to assist in the assessment of the geology of the area. In November 2011, Santos completed its acquisition of Eastern Star Gas' (ESG) acreage and operations near Narrabri, including six completed pilots in and around the Pilliga.

Santos has commenced its CSG Exploration and Appraisal Program in the Narrabri area within PEL238, PAL2 and PPL3 (herein referred to as the program). Figure 1 shows the regional location of PEL 238, PAL 2 and PPL3.

Figure 1: Regional location of PEL 238, PAL 2 and PPL3



The program includes recommencing the operation of a number of existing pilot wells, drilling and operating new pilot wells and constructing and operating water and gas management facilities to support the program. Appraisal activities, including pilot testing, surface infrastructure operation and water and gas management, will occur for up to three years.

The program activities are necessary for the ongoing exploration, appraisal and evaluation of the CSG hydrocarbon potential in PEL 238, PAL 2 and PPL3. The program will assist in gaining further knowledge of coal fines, gas composition and flow rates, the deliverability of the reservoir and investigating well design, drilling and completion technologies. This information is essential to determine whether a commercial gas production project is viable within the Narrabri area and would be used to assist in the development planning of such a project.

1.4. Existing approvals

The program activities are subject to regulation and approval by the New South Wales and Australian Governments. Table 2 provides a summary of the relevant activity approvals and corresponding legislation. The activity description includes the associated produced water management infrastructure to be constructed and operated. Figure 2 provides a layout of the existing and future exploration and appraisal infrastructure.

In June 2013 Santos referred the program to the Australian Government for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* in relation to matters of national environmental significance. This included an assessment as to whether the activity, as a coal seam gas development, will have or is likely to have, a significant impact on water resources. Santos provided detailed information on the production and management of produced water to the Government during its assessment.

On 1 October 2013 the Minister for the Environment decided that the action was not a controlled action if the activity is undertaken in accordance with particular stated measures.

Table 2: Summary and status of relevant State and Commonwealth Approvals

Regulator	Activity	Approval Pathway	Status (1 February 2014)
Australian Government	Santos Energy NSW CSG Exploration & Appraisal Program	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Decision: Not Controlled Action – Particular Manner
NSW Dept. Primary Industries	Bibbiewindi Pond 2 and 3 water management infrastructure	EP&A Act Part 5	Approved
NSW Dept. Primary Industries	Bibbiewindi Multi-Lateral Pilot (drilling of 12 wells and operation of pilot)	EP&A Act Part 5	Approved
NSW Dept. Primary Industries	Bibbiewindi West Pilot (drilling of 5 wells and operation of pilot)	EP&A Act Part 5	Approved
NSW Dept. Primary Industries	Dewhurst 13-18 (drilling and operation of Dewhurst 13-18H pilot (previously known as the Dewhurst 8 Lateral Production Pilot))	EP&A Act Part 5	Approved
NSW Office of Coal Seam Gas	Dewhurst 22-25 Pilot (drilling four appraisal wells, converting existing core hole to appraisal well and operation)	EP&A Act Part 5	Approved

Regulator	Activity	Approval Pathway	Status (1 February 2014)
NSW Office of Coal Seam Gas	Dewhurst 26-29 Pilot (drilling of four appraisal wells and operation)	EP&A Act Part 5	Approved
NSW Office of Coal Seam Gas	Dewhurst Northern Water and Gas Flow Lines (22.8 kilometres (km) long water and gas flow lines)	EP&A Act Part 5	Approved
NSW Office of Coal Seam Gas	Dewhurst Southern Water and Gas Flow Lines (4.5 km long water and gas flow lines)	EP&A Act Part 5	Approved
NSW Dept of Trade and Investment	Leewood Produced Water and Brine Management Project that includes: Construction and operation of two 300 ML each storage ponds and associated infrastructure) Construction and operation of a 5ML produced water tank at the Bibblewindi Water Transfer Facility (Bibblewindi Water Transfer Tank) to facilitate the transfer of produced water from the pilot wells to the Leewood Produced Water Facility. Construction and operation of the Leewood Water Pipeline which will transfer produced water from the Bibblewindi Water Transfer Facility to the Leewood Produced Water Facility.	EP&A Act Part 5	Approved
NSW Dept of Trade and Investment	Tintsville Pilot (construction and operation of Tintsville 2-7 pilot)	EP&A Act Part 5	Approved
NSW Dept of Trade and Investment	Tintsville Pilot (construction and operation of gas and water management infrastructure).	EP&A Act Part 5	Approved
NSW Office of Coal Seam Gas	Tintsville 2-7 Pilot (reoperation of existing pilot, construction and operation of flare)	EP&A Act Part 5	Approved
NSW Minister for Planning	Wilga Park Power Station modification (installation of riser on existing gas line at Leewood property and minor administrative changes)	EP&A Act Part 3A	Under assessment
NSW Minister for Planning	Bibblewindi Multi-Lateral Pilot (drilling two new wells and recommencing operation)	EP&A Act Part 4	Under assessment
NSW Minister for Planning	Dewhurst Pilot Expansion (drilling additional laterals from within existing Dewhurst 13-18 wells, drilling two additional wells Dewhurst 30-31 at the Dewhurst 26-29 pilot & operation)	EP&A Act Part 4	Under assessment
NSW Office of Water	Water allocation and licensing requirements to support the construction and operation of the above activities, including a water allocation, Water Supply Works and Water Access Licence	<i>Water Management Act 2000, Water Act 1912</i>	Approved on a project by project basis
Environment Protection Authority	Environment Protection Licence for coal seam gas exploration, assessment and production	<i>Protection of the Environment Operations Act 1997</i>	Under assessment

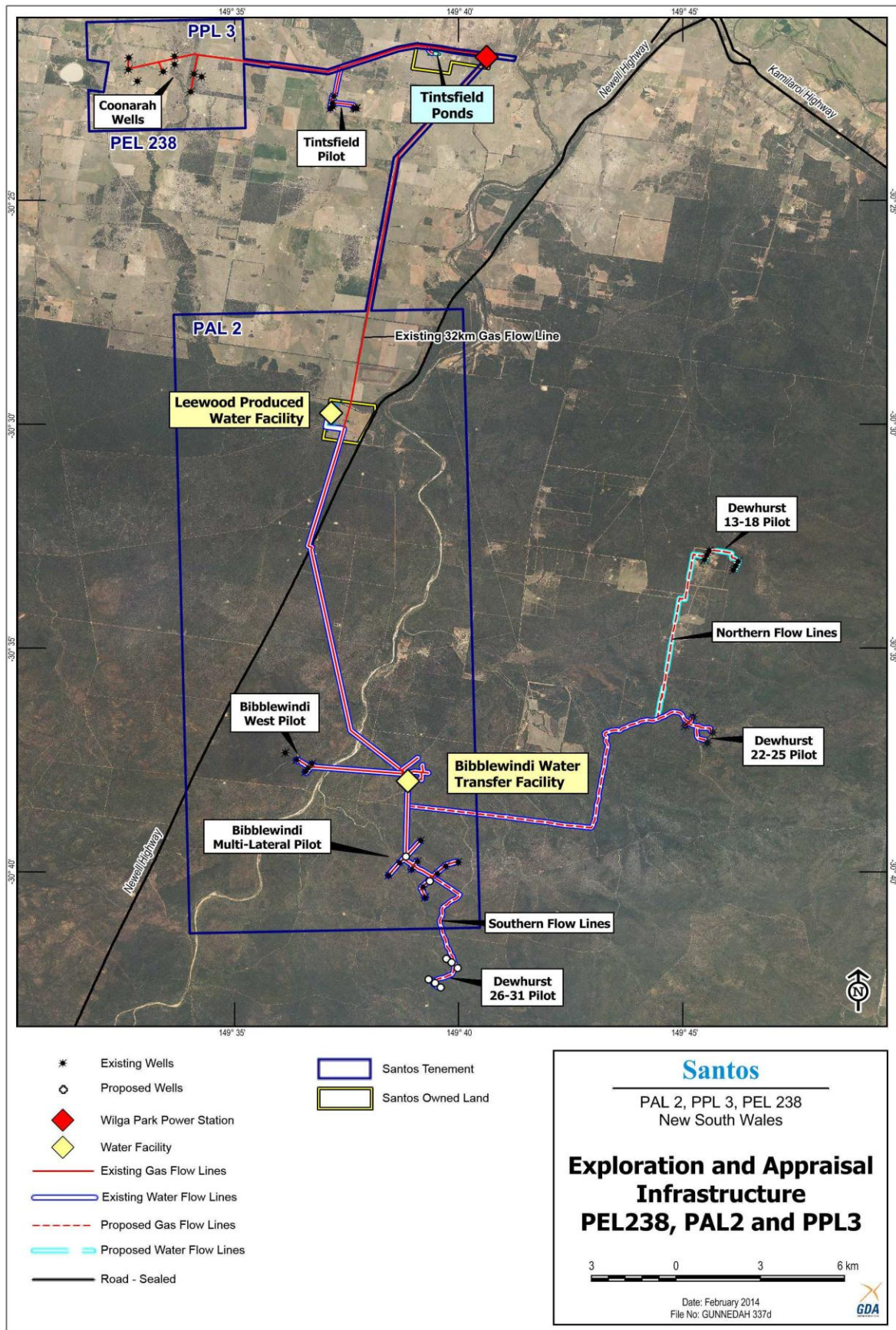
EP&A Act *Environmental Planning and Assessment Act 1979* (NSW)

1.5. Implementation of this Plan

This PWMP applies to the management of produced water produced during the exploration and appraisal activities. It includes information on options being investigated for the treatment and reuse of the produced water (section 4). Treatment and reuse of produced water will be in accordance with legislative requirements, including impact assessment and approval processes where this is required. If further legislative impact assessment processes are required to treat and use produced water, this PWMP will be updated in accordance with the outcomes of this process.

Santos will complete an evaluation of treatment and management options for produced water associated with any commercial gas production project during the impact assessment process for such a project. As noted above, the data collected from the exploration and appraisal program will provide critical information (water quality, yield and rates) to assist in defining the water production curves and required design of water management systems for a commercial gas production project. Produced water management infrastructure would be upgraded and/or designed and constructed in accordance with the project approval and this PWMP would be updated at that stage to reflect the arrangements for produced water management to be implemented.

Figure 2: Exploration and Appraisal Pilots and Infrastructure



2. Characterisation of Produced Water

2.1. Produced water source

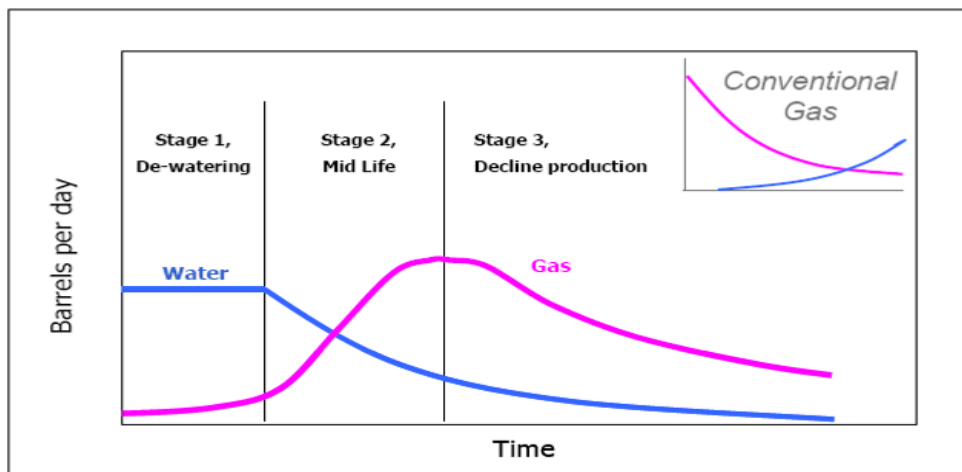
CSG development will primarily target gas reserves associated with Early Permian coal seams of the Maules Creek Formation, located at depth in the northern portion of the Gunnedah Basin.

The primary target seams (Bohena, Parkes, Namoi and Rutley seams) of the early Permian Maules Creek Formation occupy the basal part of the Bohena Trough within the northern part of the Gunnedah Basin. The coal seams are generally moderately transmissive, exhibiting higher hydraulic conductivity than the adjacent units. However, these units are not utilised for water supply due to the depth and presence of the alluvium and Pilliga Sandstone closer to the ground surface. The coal seams are typically characterised by poor (saline) water quality.

Overlying the target seams are approximately 600 - 800 metres (m) of Permian and Triassic strata. Jurassic-age strata belonging to the Surat Basin, a south eastern extension of the Great Artesian Basin, overly the Permo-Triassic strata and are themselves overlain in part by more recent consolidated and unconsolidated alluvial sediments.

Gas trapped in coal is adsorbed onto the coal surface in cleats and joints or micro pores and held in place by reservoir and water pressures. To extract the gas it is necessary to reduce the pressure by first removing water (known as produced water). Typically, water production is higher earlier in the life of a CSG field and declines as gas production increases as demonstrated in Figure 3

Figure 3: Stages of Produced Water and CSG Production



2.2. Produced water quantity

Details of the estimated quantity of produced water associated with the operation of the pilots for the exploration and appraisal program is provided in Table 3. These estimates are based on the operation of each pilot for a three year period and are based on data collected during the previous operation of pilot wells within the Narrabri area.

Table 3: Estimated volume of produced water for the Exploration and Appraisal program

Pilot	Total Extraction over operation of pilot – based on average extraction rates (ML)	Maximum Extraction (ML/day)	Average Extraction (ML/day)
Dewhurst 13-18 Pilot	331.1	0.40	0.30
Dewhurst 22-25 Pilot	285.1	0.27	0.26
Dewhurst 26-31 Pilot	413.8	0.45	0.38
Bibblewindi Multi-lateral Pilot	285.1	0.58	0.26

Pilot	Total Extraction over operation of pilot – based on average extraction rates (ML)	Maximum Extraction (ML/day)	Average Extraction (ML/day)
Bibblewindi West Pilot	93	0.21	0.09
Tintsfield 2-7 Pilot	25.2	0.04	0.02

Simulations prepared indicate that peak produced water extraction for the exploration and appraisal program will be approximately 1.3ML/day. This estimation is contingent on the timing for commencement of pilot activities and may change depending on timing of approvals and other operational considerations.

The volume of water generated during the production phase is determined by the properties of the coal and the depressurisation targets that must be achieved to facilitate gas production. There is limited ability to reduce depressurisation targets (and associated water production) during appraisal testing as this impacts gas flow and volumes extracted and therefore reduces the information that can be gained during the testing period.

There is produced water remaining from the previous operation of CSG activities in PAL2 and PEL238 (prior to Santos' acquisition). This remaining produced water will be managed in accordance with this PWMP. The volumes and quality field measurements of material held in each facility are included in the table below.

Storage name	Volume (ML) (3 February 2014)	Water quality field measurements (January 2014)		
		pH	Temperature (C)	Total Dissolved Solids (mg/L)
Bibblewindi Water Transfer Facility (Pond 3)	96	9.35	36.6	33020
Tintsfield Ponds (Pond 2)	47	9.51	30.2	34320

2.3. Produced water quality

The quality of produced water is primarily dependent upon the geology of the area in which CSG wells are located and consequently, variability between wells can be high. Evidence suggests that the produced water quality from a single well is generally within a consistent range with fluctuations in the order of 20% (+/-) over the lifetime of a well.

Table 4 provides the average concentrations for produced water quality. The information is based on historical water quality monitoring data collected from wells and ponds within the Narrabri area.

Table 4: Produced water quality

Parameter	Units	Produced Water <i>Average concentration</i>
Total Dissolved Solids (TDS)	mg/L	21,000
Temperature	°C	15 - 30
pH		8.33
Total Suspended Solids (TSS)	mg/L	30
Turbidity	NTU	50
Carbonate (CO ₃)	mg/L as CaCO ₃	670
Bicarbonate (HCO ₃)	mg/L as CaCO ₃	10,100
Chloride (Cl)	mg/L	2,000
Sodium (Na)	mg/L	6,200
Sulphate (SO ₄)	mg/L	4
Calcium (Ca)	mg/L	7
Magnesium (Mg)	mg/L	4.0
Potassium (K)	mg/L	45
Strontium (Sr)	mg/L	1.3
Barium (Ba)	mg/L	13
Fluoride (F)	mg/L	5.8
Silica (SiO ₂)	mg/L	23
Boron (B)	mg/L	0.87
Iron (Fe, dissolved)	mg/L	0.28
Cyanide (Total)	mg/L	0.004
Manganese (Total)	mg/L	0.009
Aluminium (Total)	mg/L	0.10
Phosphorus (Total)	mg/L	0.14
Ammonia	mg/L as N	13
Nitrate	mg/L as N	0.10
Nitrogen (Total)	mg/L	14
Copper (Total)	mg/L	0.022
Zinc (Total)	mg/L	0.023
Arsenic (Total)	mg/L	0.010
Chromium (Total)	mg/L	0.006
Hexavalent Chromium	mg/L	<0.05
Cadmium (Total)	mg/L	0.0053
Mercury (Total)	mg/L	0.00071
Molybdenum (Total)	mg/L	0.00064
Nickel (Total)	mg/L	0.0013
Antimony (Total)	mg/L	0.00012
Selenium (Total)	mg/L	0.0150
Uranium (Total)	mg/L	0.0001
Lead (Total)	mg/L	0.0037

3. Produced Water Management

Produced water management for the exploration and appraisal activities involves the development of local and regional gathering, storage and transfer systems. Extensive impact assessment and approval of the construction and operation of the produced water management infrastructure has been undertaken in accordance with legislative requirements. Detailed information on the design, construction and operation of the produced water management infrastructure is provided within the application material provided to regulators as part of the assessment and approval of each project. Table 2 provides a summary and status of the relevant assessment and approval processes and Figure 2 provides a map of the location of the infrastructure. The construction and operation of the infrastructure is subject to many conditions contained within the relevant approvals.

An outline of the produced water management infrastructure and methodology is set out below. In addition, Figure 4 provides a diagrammatic overview of the infrastructure.

Santos is currently investigating the economic and technical feasibility of treating the produced water from exploration and appraisal activities by reverse osmosis or other methods. The options under evaluation for produced water treatment and reuse are provided in section 4. The implementation of treatment and/or reuse of produced water from exploration and appraisal activities will be subject to any regulatory and impact assessment requirements in accordance with relevant legislation.

Produced water will be transported to an appropriately licensed facility for treatment or disposal if Santos decides not to treat and/or reuse produced water in its operations.

3.1. Produced water gathering and transfer

A description of the produced water gathering and transfer infrastructure and processes is provided here. Produced water remaining from previous operations will also be managed in this way. Refer to Figure 4 for a diagrammatic overview and Table 5 contains a Summary of Produced Water Storage Facilities.

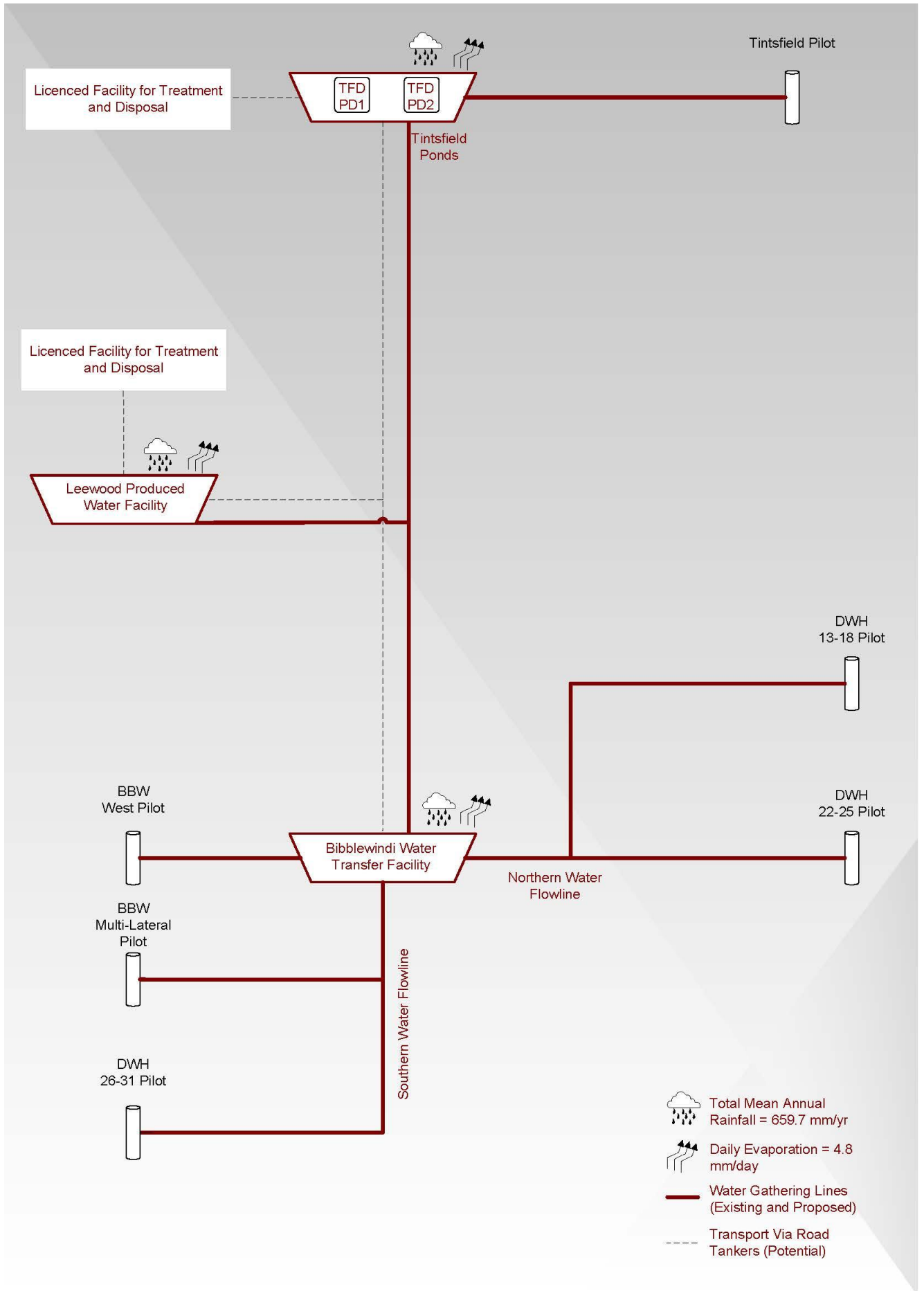
At each pilot produced water will be pumped from the separator at each well head through the water gathering lines to a centralised balance tank for that pilot (where installed). Produced water is then pumped from the balance tank (or directly from the pilot well where no balance tank is installed) to the Bibblewindi Water Transfer Facility or Tintsville Ponds via water flow lines.

The Bibblewindi Water Transfer Facility, including the 5ML balance tank and Bibblewindi Ponds 2 and 3, will be used to store and balance produced water received from pilots prior to its transfer to the Leewood Produced Water Facility (under construction, first pond expected to be operational March 2014) or the Tintsville Ponds (Pond 1 and Pond 2) located on Santos owned land adjacent to the Wilga Park Power Station.

Depending on operational requirements, produced water may be transferred between the three facilities (i.e. Bibblewindi Water Transfer Facility, the Leewood Produced Water Facility and the Tintsville Ponds) by pipeline or road transport.

The flowlines to be used for the transfer of produced water and brine includes the Dewhurst Northern and Dewhurst Southern Water Flowlines, the existing water flowlines from Bibblewindi West and Bibblewindi Multi-Lateral pilots to the Bibblewindi Water Transfer Facility, the existing flowlines from the Tintsville Pilot to the Tintsville Pond, the Leewood Water Pipeline (under construction) and the gas pipeline from Bibblewindi Water Transfer Facility to the Tintsville Ponds (with offtake at Leewood Produced Water Facility, subject to Part 3A modification approval, under assessment) and associated infrastructure.

Figure 4: Diagrammatic overview of produced water infrastructure



3.2. Produced water storage facilities

Refer to Figure 4 for a schematic overview of the produced water infrastructure.

A summary of the approved produced water storage facilities is presented in Table 5. The table includes information on storage volumes of each facility and controls to prevent and minimise pollution including pond liners and monitoring equipment installed.

3.3. Overview of infrastructure monitoring

An infrastructure monitoring program is implemented across the Produced water and brine storage facilities and gathering and transfer infrastructure. A summary of the infrastructure monitoring measures and their frequency for each storage is included in Table 5.

In addition to the monitoring outlined for the Leewood Produced Water Management Facility, the ponds will be subject to the surveillance requirements for prescribed dams, including the preparation of a Surveillance Report. This report requires inspection and reporting of the condition of the ponds including embankment slopes, crest and spillway, presence of any erosion, vegetation, seepage and monitoring instrumentation.

The design, construction and operation of the High Density Poly-Ethylene (HDPE) flowlines is undertaken in accordance with the Australian Pipeline Industry Association's *Code of Practice for Upstream Polyethylene Gathering Networks - CSG Industry* (March 2013). This includes detailed quality control measure requirements to ensure the integrity during the construction process. After construction and prior to commissioning, the entire flowline is required to be pressure tested and once operating, ongoing pressure monitoring using remote telemetry occurs.

Pipeline integrity management procedures are maintained to ensure flowline infrastructure remains fit for purpose at all times by implementing a systematic approach to operation, maintenance, testing and inspection activities. Periodic inspections are carried out to identify actual or potential problems that could affect the integrity of the pipeline and any maintenance required is carried out in a timely manner.

Santos also undertakes an extensive regional groundwater monitoring program to monitor groundwater in the region of its operations. This program is the subject of the Groundwater Monitoring and Modelling Plan prepared in relation to exploration and appraisal activities and approved by the NSW Office of CSG in July 2013.

In relation to the operation of the produced water storage facilities, in the event that an elevated water level, in excess of a pre-defined trigger level (such as the MOL), is recorded, operators will respond in accordance with responses set out in the Trigger Action and Response Plan (TARP).

TARPs set out the actions to be undertaken in response to situations outside of normal operating conditions. The TARP's objective is to minimise and manage any risks to human safety, the environment, property and operations. The TARP also includes directions on internal and external reporting and notification procedures in accordance with legislative requirements. Actions that will be considered in the event that the maximum operating level is exceeded include 'shutting in' wells to cease the production of produced water, reducing the water levels through transferring water to other produced water storages and removing water for treatment / disposal at an appropriately licensed facility.

In addition, a Dam Safety Emergency Plan has been provided to the NSW Dam Safety Committee in accordance with the requirements of the *Dams Safety Act 1978*. The plan provides emergency response procedures for the management of the Leewood ponds in the event of an imminent or actual uncontrolled release from the ponds.

Table 5 Summary of Produced Water Storage Facilities

Facility name	Storage name	Full Supply Level Volume (ML)	Maximum Operating Level Volume (ML)	Controls to prevent and minimise pollution			
				Lining system	Facility monitoring (when storage contains produced water)		Shallow groundwater monitoring around storage
					Monitoring aspect	Frequency	
Biblewindi Produced Water Transfer Facility	Biblewindi Transfer Tank	4	3.75	Galvanised steel panel tank with internal polypropylene bladder. Tank is also contained within an earthen bund.	Water level	Continuous using sensors and remote monitoring. Tank is equipped with level instrumentation, alarms and trips, to ensure the tank does not over fill.	Network (currently 24) of monitoring bores installed at the facility at varying depths located up-gradient, down-gradient and cross hydraulic gradient of the water infrastructure. The bores are designed to both monitor groundwater (chemical, physical and hydraulic) (see table 4 parameters) and intercept groundwater where this is found to be present. Additional perched water layers are monitored at a number of locations to assess any vertical migration of groundwater.
					Inflow and outflow	Continuous using flow meters and remote monitoring.	
	Biblewindi Pond 2	22.9	12	HDPE membrane thickness of 2 mm.	Water level	Daily monitoring and recording.	
					Inflow and outflow	Continuous using flow data from wellhead pumps, outflow pumps and remote monitoring.	
					Embankment seepage	Monthly	
					Embankment erosion	Quarterly	
					Pond crest integrity and capping	Quarterly	
					Hydraulic structures	Quarterly	
					Pipework and valves including	Weekly	
					Pond water quality	Monthly for pH, temperature and TDS Six monthly for other quality parameters	
Rainfall and evaporation	Weekly						
Pond liner condition	Monthly						

Santos Energy NSW – Produced Water Management Plan: PEL238, PAL2 and PPL3

Facility name	Storage name	Full Supply Level Volume (ML)	Maximum Operating Level Volume (ML)	Controls to prevent and minimise pollution			
				Lining system	Facility monitoring (when storage contains produced water)		Shallow groundwater monitoring around storage
					Monitoring aspect	Frequency	
Biblewindi Pond 3					Embankment deformation	Monthly	
					Vegetation growth	Quarterly	
					Wildlife management systems (fences etc.)	Quarterly	
		182.5	165.4	HDPE membrane thickness of 2 mm.	Water level	Continuous using sensors and remote monitoring.	
	Inflow and outflow				Continuous using flow data from wellhead pumps, outflow pumps and remote monitoring.		
	Embankment seepage				Monthly		
	Embankment erosion				Quarterly		
	Pond crest integrity and capping				Quarterly		
	Hydraulic structures				Quarterly		
	Pipework and valves including				Weekly		
	Pond water quality				Monthly for pH, temperature and TDS Six monthly for other quality parameters.		
	Rainfall and evaporation				Weekly		
	Pond liner condition				Monthly		
	Embankment deformation				Monthly		
Vegetation growth	Quarterly						
Wildlife management systems (fences etc.)	Quarterly						

Facility name	Storage name	Full Supply Level Volume (ML)	Maximum Operating Level Volume (ML)	Controls to prevent and minimise pollution			
				Lining system	Facility monitoring (when storage contains produced water)		Shallow groundwater monitoring around storage
					Monitoring aspect	Frequency	
Leewood Produced Water and Brine Management Facility	Produced water Pond	389 (design)	300 (design)	Primary polyethylene geomembrane liner underlain by leak detection system underlain by a secondary liner. The secondary liner will be underlain by 300 mm of smooth clayey sub grade. The leak collection system transfers any produced water collected below the liner directly back into the pond. The system includes an alarm to notify of any sudden changes in pump operational trends.	Water level	Continuous using sensors and remote monitoring.	Network (currently 7) of monitoring bores installed at the facility at varying depths located up-gradient, down-gradient and cross hydraulic gradient of the water infrastructure. The monitoring bores are screened at a number of shallow perched water layers below the surface. Sampling of standard groundwater parameters (see table 4 parameters) is undertaken quarterly and results reviewed for any unexpected changes to physical and chemical water quality parameters and water levels.
					Inflow and outflow	Continuous using flow meters and remote monitoring.	
	Embankment seepage	Monthly					
	Embankment erosion	Quarterly					
	Pond crest integrity and capping	Quarterly					
	Hydraulic structures	Quarterly					
	Pipework and valves including	Weekly					
	Pond water quality	Weekly for pH, temperature and TDS Monthly for other quality parameters					
	Rainfall and evaporation	Weekly					
	Pond liner condition	Monthly					
	Embankment deformation	Monthly					
	Vegetation growth	Quarterly					
Wildlife management systems (fences etc.)	Quarterly						
Tintfield Produced Water Facility	Tintfield Pond 1	22.9	15.3	HDPE membrane thickness of 2 mm.	Water level	Continuous using sensors and remote monitoring.	Network (currently 23) of monitoring bores installed at the facility at varying depths located up-gradient, down-gradient and cross hydraulic gradient of the water infrastructure. The monitoring
	Tintfield Pond 2	92.0	72.6		Inflow and outflow	Continuous using flow data from wellhead pumps, outflow pumps and remote monitoring.	

Facility name	Storage name	Full Supply Level Volume (ML)	Maximum Operating Level Volume (ML)	Controls to prevent and minimise pollution			
				Lining system	Facility monitoring (when storage contains produced water)		Shallow groundwater monitoring around storage
					Monitoring aspect	Frequency	
				Embankment seepage	Monthly	bores are screened at a number of shallow perched water layers below the surface. Sampling of standard groundwater parameters (see table 4 parameters) is undertaken quarterly and results reviewed for any unexpected changes to physical and chemical water quality parameters and water levels.	
				Embankment erosion	Quarterly		
				Pond crest integrity and capping	Quarterly		
				Hydraulic structures	Quarterly		
				Pipework and valves including	Weekly		
				Pond water quality	Monthly for pH, temperature and TDS Six monthly for other quality parameters		
				Rainfall and evaporation	Weekly		
				Pond liner condition	Monthly		
				Embankment deformation	Monthly		
				Vegetation growth	Quarterly		
				Wildlife management systems (fences etc.)	Quarterly		

4. Options for produced water treatment and reuse

Produced water has the potential to be used beneficially in a number of applications. In order to increase the options for beneficial use, produced water may be treated in order to improve its quality. The potential treatment options and beneficial uses of this water are described in further detail below.

The implementation of treatment and/or reuse of produced water from exploration and appraisal activities will be subject to regulatory requirements, including the conditions of the Environment Protection Licence for CSG activities. Where treatment and reuse requires further legislative impact assessment processes, this PWMP will be updated in accordance with the outcomes of the process.

4.1. Desalination

Desalination is often used to treat produced water to reduce the concentration of Total Dissolved Solids (salts) and other constituents so that it may be beneficially used.

Reverse Osmosis (RO) desalination typically involves several steps (as shown in Figure 5) that include:

- Pre-treatment by filtration, clarification, ion exchange and bio-fouling control;
- Desalination; and
- Post treatment as required by final water use (potentially including ammonia removal, dechlorination, calcium and magnesium addition to achieve required (sodium adsorption ratio (SAR) and pH adjustment).

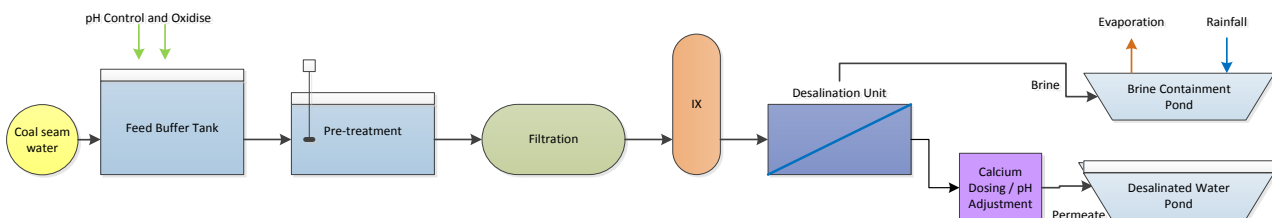


Figure 5 Summary of desalination process

RO is the leading technology for the removal of dissolved solids in produced water from CSG activities. The principal reasons for this are:

- The technology is well proven and readily available in Australia from several reputable vendors with a proven track record;
- The method is readily scalable and will achieve a final water quality that is suitable for a range of proposed uses; and
- The technology can be readily leased or purchased.

In addition to generating a high-quality desalinated water stream, RO also produces a comparatively small volume of concentrate (brine). Concentrate management is discussed further in section 4.5.

4.2. Chemical amendment

Chemical amendment is sometimes undertaken to lower the sodium adsorption ratio (SAR) of the produced water to acceptable levels for the desired beneficial uses. Amendment of permeate from RO treatment is likely to involve SAR adjustment using Gypsum and/or Magnesium Sulfate.

4.3. Amendment using other water sources

Amendment of produced water by mixing with other water sources to lower the SAR of the produced water to acceptable levels for certain beneficial uses may be undertaken. Amendment of produced water using bore water, RO permeate or other sources is able to produce a water of appropriate quality for certain beneficial uses such as dust suppression, construction and drilling, firefighting and irrigation.

4.4. Beneficial uses of produced water

Following treatment, produced water may be directed to beneficial uses that could include:

- Dust suppression, use in construction and drilling and firefighting;
- Irrigation; and/or
- Discharge to surface water as environmental flows.

The use of produced water from exploration and appraisal activities for dust suppression, construction and drilling activities and for firefighting will be in accordance with regulatory requirements, including the conditions of the Environment Protection Licence for CSG activities.

Where treatment and reuse requires further legislative impact assessment processes, this PWMP will be updated in accordance with the outcomes of the process.

4.5. Concentrate management

Where RO or other desalination methods are used for treatment of produced water prior to beneficial use, a brine concentrate will be generated that requires management. The volume of concentrate generated is dependent on the volumes and chemical properties of the produced water and the efficiency of the treatment process. Methods of reducing the volumes of concentrate generated will be investigated. These include:

- Enhancing treatment processes to increase recovery rate;
- Investigating options for secondary treatment of concentrate (brine concentration); and
- Identifying further beneficial uses of untreated produced water.

The Leewood Produced Water Facility will have a storage pond designed and constructed to enable the storage of the brine concentrate. Options for concentrate management being investigated include:

- Treatment to recover salt as a commercial product;
- Disposal of solid salt (not including brine) at an appropriately licensed landfill and/or recycling facility.

As outlined above, where treatment and reuse requires further legislative impact assessment processes, this PWMP will be updated in accordance with the outcomes of the process, including in respect to concentrate management.

5. Record keeping of produced water management

Santos has a comprehensive data management plan for the Narrabri Gas Fields that outlines the policies and procedures that will be implemented to ensure that data is managed in a consistent, efficient and effective manner in order to provide accurate records of activity operations and enhance the value of the data collected.

All data collected as part of produced water management activities will be stored and managed within Santos' environmental database, EQUIS, with web based access to data entry and reporting and a full suite of technical procedures for data collection, work flow, reporting and other functions.

Key records associated with this PWMP that will be stored and managed will include:

1. Inspection and monitoring records for facilities and dams;
2. Operational monitoring and performance data for treatment systems;
3. Water sampling and laboratory analytical reports;
4. Calibration records for field instruments and continuous water quality monitoring systems;
5. Waste Transportation and Disposal Certificates;
6. Annual Inspection reports and/or certifications of storages.

Monitoring data is subject to quality assurance (QA) and quality control (QC) protocols and procedures that ensure that data is accurate and usable. Data is subjected to consistent validation and verification procedures. Any data that fails QA and QC procedures is rejected for future use. QA and QC procedures include:

- For each batch of water quality samples sent to the laboratory, results are validated against the analysis requested on the chain of custody (COC) to ensure all results have been received;
- All results, including quality control samples (QCS) including method blanks, laboratory control samples, matrix spikes samples and surrogate samples must fall within the specific quality control limits. Appropriate field quality control samples (i.e. duplicates, field blanks, trip blanks and triplicate samples, etc.) will also be used to assist in the quality control of the data obtained from the monitoring programs;
- Program monitoring guidelines (minimum and maximum values) will likely be configured in the environmental database for each monitoring compliance requirement or to detect anomalous results. The guidelines act as quality control measures to verify that data falls within an acceptable range.

Santos Ltd
ABN 80 007 550 923
Santos Centre
Level 16, 40 Creek Street
Brisbane Queensland 4000
GPO Box 1010
Brisbane Queensland 4001
Telephone: 61 7 3838 3000
Direct: 61 7 3838 3435
www.santos.com



26 February 2014

Mr Chris Rudens
Principal Operations Officer
Office of Coal Seam Gas
NSW Trade and Investment
516 High Street
Maitland NSW 2320


Dear Mr Rudens

Further information for Produced Water Management Plan

This letter is in response to the Office of Coal Seam Gas's (OCSG) request on 21 February 2014 for further information in its assessment of the Produced Water Management Plan for PEL238, PAL2 and PPL3 (PWMP).

1. As you are aware, Santos is currently well advanced in the construction of Stage 1 of the Leewood Produced Water Management Facility. This is a purpose built water storage facility located on Santos owned land outside of the Pilliga forest. As set out in the PWMP, upon its completion and certification there will be a staged transfer of the current contents of Bibblewindi Pond 3 to Leewood. The produced water from the current exploration and appraisal program will also ultimately go to Leewood for storage and possible future treatment and reuse, subject to further approvals. The use of the Bibblewindi Ponds 2 and 3 and Tintfield ponds 1 and 2 will be for the interim storage of produced water prior to its transfer to Leewood.

The timeframe for use of Bibblewindi Pond 3 in its current form is still to be determined and will depend on approvals and timing for completion and certification of the Leewood facility. At this stage however it is envisaged that produced water will be removed from Bibblewindi Pond 3 by the end of Q1, 2015. After this time and the pond will be assessed to determine its future use. Options to be considered include removal, repair and replacement, with the final decision depending on the outcome of the assessment.

2. The Environment Protection Authority is currently assessing Santos' application for an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*. Santos understands that the EPA is considering the inclusion of a requirement for a Pollution Reduction Program (PRP) on the EPL. The OCSG may wish to contact the EPA in relation to its proposed EPL conditions. Santos' use of Bibblewindi Pond 3 will be in accordance with any EPL conditions, including any requirement for the preparation and implementation of a PRP in relation to Bibblewindi Pond 3.
3. The PWMP provides maximum operating levels (MOL) for each of the produced water storages in Table 5. The MOL is the maximum water level of the storage under normal operating conditions and is set at a level that provides an allowance for incident rainfall. Attached is further information on pond management strategies including a TARP for elevated pond management levels.

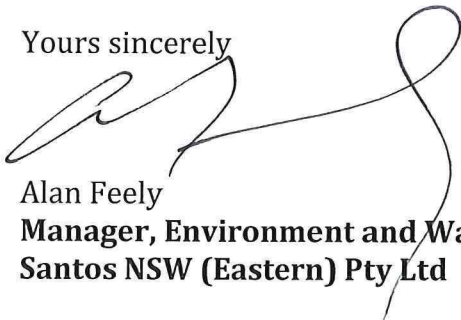
In relation to the Bibblewindi transfer tank, the tank system will incorporate sensors and automatic shut down systems that will be monitored through the SCADA system. If the tank approaches its high level set point an alarm will be triggered in the control centre. If this alarm is not acknowledged, an automatic signal is sent to the wells to shut down the field in and therefore cease water production. Field staff will also conduct monitoring at the site daily. The tank will be operated in accordance with Santos' engineering standards and standard operating procedures.

4. It is worth noting that the disposal of produced water to a waste facility would be a last resort as produced water treatment technologies are both well known and readily available. Santos is confident that there is sufficient capacity within NSW to accept the volume of produced water. A number of trade waste disposal facilities have been considered for disposal of produced water including the Homebush Bay Waste Treatment Facility. Produced water transported to the site may be blended with stormwater or other water to meet the relevant acceptance criteria at the facility.

Santos appreciates the OCSG's timely assessment of the PWMP. Delays to the finalisation of the PWMP will impact on Santos' ability to recommence pilot resting operations and therefore delay receipt of the necessary pilot data to inform our commercial gas project decisions.

Should you require any further information, please do not hesitate to contact Ms Sofia Oliver, Regulatory Approvals Coordinator, on telephone (07) 3838 5823 or email Sofia.Oliver@santos.com.

Yours sincerely



Alan Feely
Manager, Environment and Water
Santos NSW (Eastern) Pty Ltd

Further information on management of water levels in produced water storage facilities

1.0 SCOPE

The intent of this further information is to provide details of the management of water levels to support Santos' Produced Water Management Plan for PEL238, PAL2 and PPL3. Santos proposes to operate produced water and brine storage ponds to support its Coal Seam Gas Exploration and Appraisal Program in the Narrabri area. The produced water storage facilities are Bibblewindi Ponds 2 & 3, Tintsville Ponds 1 & 2 and the Leewood Produced Water Pond and the Leewood Brine Ponds. Further information on the trigger action response plan (TARP) in the event of exceedances of standard operating levels is also included.

2.0 DEFINITION OF PRODUCED WATER STORAGE MANAGEMENT LEVELS

For the purpose of monitoring and managing pond levels the pond levels are defined below. These definitions are based on the Queensland guidelines '*Manual for Assessing Hazard Categories and Hydraulic Performance of Dams*' (Department of Environment and Resource Management, 2011).

- Wet Season Containment (**Maximum Operating Level (MOL)**) – Includes a minimum spare storage capacity (Design Storage Allowance) required at the nominal start of the wet season (1 November each year) to give the regulatory agency confidence that wet season inputs can be managed without loss of containment (i.e. spillway discharge).
- Storm Event Containment (**Emergency Reporting Level (ERL)**) – The dam level at which loss of containment could potentially occur within a single storm event (72 hour duration event) triggering notifications and further action.
- Spillway Capacity (**Full Supply Level (FSL)**) – Sufficient spillway capacity is required to ensure that the design flood event can be conveyed by the spillway without causing overtopping of the dam embankment which could lead to catastrophic failure of the dam structure.

3.0 PRODUCED WATER STORAGE LEVELS DETAIL

The defined management levels are set out for each produced water storage facility in Table 1.

Table 1: Defined Pond Operating Levels

Produced Water storage facility	Full Supply Level (FSL) (m AHD)	Emergency Response Level (ERL) (m AHD)	Maximum Operating Level (MOL) (m AHD)
Bibblewindi Pond 2	280.9	280.58	279.90
Bibblewindi Pond 3	282.6	282.29	281.65
Tintsville Pond 1	225.84	225.46	224.57
Tintsville Pond 2	225.84	225.53	224.85
Leewood Produced Water Pond	249.85	249.41	249.03
Leewood Brine Pond	250.4	249.92	249.59

4.0 PRODUCED WATER STORAGE LEVEL MEASUREMENT & REPORTING

Monitoring of storage levels is undertaken with the use of pressure sensors that continuously measure and record storage depth, volume and surface area based on hydrostatic pressure. These automated meters are submersed in the pond to a depth as close to the base of the pond as reasonably practicable, and are used in conjunction with surveyed data to determine the water level of the pond. Telemetry is used to allow for remote real-time monitoring of the pond levels and this is used to monitor storage capacity in conjunction with other parameters such as upstream pilot or wellhead water production data.

Field operators are required to record the pond level and volume on a daily basis. Other operating markers/indicators may also be used in conjunction with the pressure sensor monitoring, such as volume and MOL indicator markers on storage facility walls. The level sensors system used in the existing ponds undergoes regular assessment and, when necessary, recalibration occurs six monthly in order to ensure the accuracy of readings.

In addition to monitoring, regular forecasting of predicted water production will be undertaken to identify the potential for elevated levels as early as possible to allow strategies to be implemented to minimise the potential for pond levels to exceed the MOL.

5.0 TRIGGER ACTION RESPONSE PLAN

Trigger Action Response Plans (TARPs) are developed to identify, assess and respond to abnormal conditions and are implemented to manage risk to operations, personnel and the environment. The TARP provides the actions to be taken if defined pond management levels are reached. The TARP for pond level management is provided in Table 2.

Produced Water Storage Pond Level: Trigger Action Response Plan

Trigger Level	Characteristics of Level	Possible Reasons	Actions	Action By	Notification
NORMAL	≤ 95% of MOL water level	Normal operations	<ul style="list-style-type: none"> No remedial action necessary Quarterly water quality sampling Monthly review meeting 	No special action required	None necessary
	95% of MOL	Normal operations approaching MOL	<ul style="list-style-type: none"> Review field production strategy Develop water reduction strategies. Quarterly water quality sampling Weekly review meeting 	Field Supervisor	<ul style="list-style-type: none"> Manager, Environment and Water, Santos NSW Water Management Review Team Site Operators Field Production Team
LEVEL 1	> MOL to ≤ ERL water level	<ul style="list-style-type: none"> Heavy rainfall Increased produced water production 	<ul style="list-style-type: none"> Implement actions to reduce pond level to below MOL. Actions may include: <ul style="list-style-type: none"> ➢ Reduce or cease produced water production ➢ Transfer of water to other produced water storage facilities ➢ Removal of water for disposal at appropriately licensed facilities Weekly water quality sampling Weekly review meeting 	Field Supervisor	<ul style="list-style-type: none"> Manager, Environment and Water, Santos NSW Water Management Review Team Site Operators Field Production Team
LEVEL 2	> ERL to ≤ FSL water level	<ul style="list-style-type: none"> Heavy rainfall Increased produced water production 	<ul style="list-style-type: none"> Cease produced water production Implement actions to reduce pond level as per Level 1 Daily water quality sampling Daily review meeting 	Operations Manager	<ul style="list-style-type: none"> Incident Management Team Office of Coal Seam Gas Environmental Protection Authority Any relevant land holders Manager, Environment and Water, Santos NSW

Produced Water Storage Pond Level: Trigger Action Response Plan

Trigger Level	Characteristics of Level	Possible Reasons	Actions	Action By	Notification
					<ul style="list-style-type: none"> Water Management Review Team Site Operators Field Production Team
UNACCEPTABLE	> FSL water level Water is being released to the environment.	<ul style="list-style-type: none"> Heavy rainfall Increased produced water production 	<ul style="list-style-type: none"> Activate Incident Management Team, in accordance with Santos procedure Implement Emergency Response Plan* Execute mitigation and spill containment strategies as appropriate Implement actions to reduce pond level as per Level 1 Daily water quality sampling Daily review meeting 	Operations Manager	<ul style="list-style-type: none"> Incident Management Team Office of Coal Seam Gas Environmental Protection Authority Any relevant land holders Manager, Environment and Water, Santos NSW Water Management Review Team Site Operators Field Production Team

*Santos has an Emergency Response Plan (ERP) for the operation of all facilities in the Narrabri area. The ERP contains details about:

1. Means by which an emergency response is initiated
2. Defined key roles and responsibilities required to respond to an emergency
3. Facilities required to co-ordinate the emergency response (e.g. Emergency Operations Centre)
4. Key contact list
5. Criteria for escalating an emergency and the means by which the Santos Incident Management Plan is initiated
6. Likely emergency scenarios and guidelines for responding to such scenarios
7. Communication and documentation requirements
8. Evacuation protocols and muster points.



Trade & Investment

Office of the Secretary

OUT14/6499

Mr Alan Feely
Manager Environment and Water
Santos NSW Pty Ltd
Level 16
40 Creek Street
Brisbane QLD 4000

Dear Mr Feely

PEL238, PAL2, PPL3 – Produced Water Management Plan

I refer to the Produced Water Management Plan (PWMP) dated 10 February 2014. The PWMP has been reviewed by the Office of Coal Seam Gas and determined to satisfactorily address the conditions of Petroleum Exploration Licence 238 (PEL238).

It is noted that Santos has undertaken consultation with the NSW Environmental Protection Authority and the NSW Office of Water as required by the licence conditions.

In accordance with Condition 14 of PEL238, Condition 2 of Petroleum Assessment Lease 2 (PAL2), and Condition 3 of Petroleum Production Lease 3 (PPL3), granted under the provisions of the *Petroleum (Onshore) Act 1991*, the PWMP is approved subject to the conditions set out below.

CONDITIONS

General

1. The activities nominated in the PWMP must be carried out at the location(s) and in accordance with the methods contained in the documents titled:
 - (a) *Santos NSW (Eastern) Pty Ltd, Energy NSW Coal Seam Gas Exploration and Appraisal, Produced Water Management Plan, PEL238 PAL2 PPL3 dated 10 February 2014; and*
 - (b) *Further Information for Produced Water Management Plan letter dated 26 February 2014.*

Bibbiewindi Pond 3

2. The produced water holding pond known as Bibbiewindi Pond 3 can only be used to contain additional produced water if approved in accordance with the Environmental Protection Licence issued under the *Protection of the Environment Operations Act 1997*.

Access to Produced Water Management Plan approval and relevant documents

3. The licence holder must ensure that a copy of this approval and the PWMP described at Condition 1 is:
 - (a) accessible on the sites authorised by this approval; and
 - (b) made available to all supervisors or other persons concerned in the day-to-day management of prospecting operations authorised by this exploration licence.

Note

Other activity approvals may be required pursuant to Conditions of PEL238, PAL2 and PPL3 for construction and operation of exploration (stratigraphic drill holes and appraisal wells) and related water infrastructure (produced water gathering, storage and treatment facilities). These will need to be assessed separately under *Part 5 of the Environmental Planning and Assessment Act 1979*, or where approval under Part 4 is required.

Should you wish to discuss any details of this approval please contact Chris Rudens, Principal Operations Officer/Inspector Environment, Office of Coal Seam Gas via email chris.rudens@trade.nsw.gov.au or phone 02 4222 8321.

Yours sincerely



Mark I Paterson AO

Secretary

4/3/14



Figure 2 — Eastern and south-eastern Australian gas transmission system



Meeting Action Item Response

Reference:	20140409_NCCC
Subject:	Meeting Action Items – March 2014 Meeting Narrabri CCC
Request date:	12 March 2014
Requested by:	David Ross Chair Narrabri CCC
Background Request:	<ol style="list-style-type: none"> 1. Santos to provide the conversion factor from standard cubic feet to petajoules 2. Santos to provide the metric values for scfd 3. Santos to find out if the EPA requirements come in at 16 megawatts 4. Santos to notify committee if gas to be supplied to Newcastle 5. Santos to respond to questions raised regarding recent aquifer contamination and associated questions within 10 days
Response:	<p>Item 1 - Santos to provide the conversion factor from standard cubic feet to petajoules</p> <ul style="list-style-type: none"> • 1 million cubic feet is equal to 1.06 terajoules or 0.00106 petajoules • There is a conversion calculator available on the Santos website at http://www.santos.com/conversion-calculator.aspx <p>Item 2 - Santos to provide the metric values for scfd</p> <ul style="list-style-type: none"> • 1scf is equal to .0283 cubic metres <p>Item 3 - Santos to find out if the EPA requirements come in at 16 megawatts</p> <ul style="list-style-type: none"> • There are no additional requirements at 16 megawatts. Under Item 17 of Schedule 1 of the <i>Protection of the Environment Operations Act 1997</i>, a licence is required for general electricity works that has a capacity to generate more than 30 megawatts of power. <p>Item 4 - Santos to notify committee if gas to be supplied to Newcastle</p> <ul style="list-style-type: none"> • The primary objective of the Narrabri Gas Project is to commercialise natural gas from coal seams for the East Australian gas market to support

	<p>the energy security needs of NSW.</p> <ul style="list-style-type: none"> • To connect the gas into the NSW domestic market, a transmission pipeline running south will be constructed to connect into existing infrastructure. • A map of the existing eastern and south-eastern Australian gas transmission system is included at Attachment 1. • The proposal to build a pipeline to connect gas from Coolah to Newcastle was an old Eastern Star Gas proposal. <p>Item 5 - Santos to respond to questions raised regarding recent aquifer contamination and associated questions within 10 days</p> <ul style="list-style-type: none"> • Complete. This was provided as a separate response.
Briefing Officer:	Annie Moody Team Leader, Community and Land
Date:	2 April 2014

SANTOS UPDATE – April 2014

Proposed upcoming work program – Narrabri Area

Time frames are indicative as schedules are dependent on factors such as approval times, weather and rig availability.

Decommissioning of wells:

- There are no plug and abandon activities planned for April

Workovers:

- There has been a slight delay to the workover program due to wet weather, however the program commenced at the end of March 2014 with activity planned for Dewhurst 22 to Dewhurst 25 and Dewhurst 6 well sites. This is expected to be ongoing throughout April
- The workover rig will then move to the Bibblewindi East and Bibblewindi West pilot wells
- The workover rig is used to install and/or maintain pumps on existing wells

Drilling of exploration core holes:

- There are no core hole activities planned for April

Pilot wells:

- Drilling continues on the Dewhurst 26 – 29 well sets
- Rig will be drilling at Dewhurst 27 and then move to Dewhurst 29 and remain at that location through April
- Tintsville pilot and Bibblewindi West pilot remain on-line

Leewood

- Major civil works are complete at the Leewood water storage facility
- The commissioning of the Bibblewindi water transfer system and the first cell of the Leewood Ponds is underway
- The transfer of water from the pond at Bibblewindi to Leewood is scheduled to commence in April
- Completion of the remaining pond cells is expected later in the year
- The Review of Environmental Factors (REF) for Leewood Phase 2 is being prepared
- The proposed activity involves the construction of treatment facilities for produced water and brine at Leewood.
- Community consultation activities for Leewood Phase 2 will be undertaken when the scope of the project is finalised.

Pilliga rehabilitation:

- Irrigation continues as part of the rehabilitation of the Bohena and Bibblewindi sites in the Pilliga

Other work:

- Wilga Park Power Station has been re-commissioned and is now operating with gas from the Bibblewindi West pilot wells.

Site visits:

- The next scheduled community site visit will take place on Thursday 17 April. If you are interested in attending or would like more information, please call Lesley Anderson on 6792 9035 or email lesley.anderson@santos.com

Community:

- Welcome to Krystle Sutherland who will be joining Santos' Aboriginal Engagement team in the role of Aboriginal Engagement and Cultural Heritage Coordinator from mid-April and will be based in the Narrabri Office

Other:

- Intermittent protest action in operational areas
- The next meeting of the Santos Community Committee on CSG for the Narrabri Shire will be held on Wednesday 9 April
- The Preliminary Environmental Assessment (PEA) for the Narrabri Gas Project was submitted to the NSW Department of Planning and Infrastructure on 31 March and a copy of the document will be available on their website. Community consultation activities will continue over the coming months to inform key stakeholders and the community about the Project
- The Commonwealth House of Representatives Environment Committee will conduct an inquiry into streamlining environmental regulation, 'green tape', and one stop shops for environmental assessments and approvals. Submission period closes on Friday 11 April, 2014. Terms of reference and additional information can be found at:
http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=environment/greentape/index.htm